ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 25th May, 1868.

By Sir Roderick Impey Murchison, Bart., K.C.B.,

PRESIDENT.

Gentlemen,

The tide of prosperity, which for some years has marked the progress of the Royal Geographical Society, continues, I am happy to say, to flow on without symptoms of an ebb. Rejoicing as I do in our popularity and usefulness, it becomes me now to state, that I have seen with regret the great difficulties which have occurred in affording sitting room to our greatly-augmented numbers, and the visitors who are introduced to our meetings. Complaints having proceeded from many of our old Associates as to the impossibility of finding places for themselves, the Council were under the necessity of devising a remedy, and the following arrangement has been made:—The large central portion of the hall will henceforward be exclusively occupied by Fellows, the sides only being set apart for ladies and visitors.

Though this plan is as good as present circumstances will admit, it is merely temporary; for the wings of Burlington House, in one of which we have been permitted to assemble, through the courtesy of the Royal Society and the University of London, are ere long to be pulled down; and when the new rooms of the Royal Society are built, no one of them will be large enough to receive the audiences that attend our meetings. Now, as under any circumstance we shall be compelled to raise a great edifice for ourselves, I have the pleasure to announce, that, ever mindful of the coming necessity, the Council have applied to the Chief Commissioner of Woods and

Forests, and obtained a promise that we shall be considered, on the allotment of the ground about to be cleared between Whitehall and the Thames. I trust that an advantageous site may be ceded to us, as the public body which, for the small sum of 500*l.* per annum granted to us by Parliament, keeps up for the use and consultation of the public a well-furnished Map Office.

I may add that it is my hope that when, through the demolition of the building in which we are now assembled, we shall be obliged to seek for a temporary asylum whilst a large edifice is being raised out of our own funds, we may, upon application, be allowed to meet *ad interim* in the grand new hall of the University of London, now nearly finished, the Council of which body, in conjunction with the Royal Society, has hitherto treated us with so much consideration.

In the following review of the affairs of the Society, and the progress of Geography, during the past year, I commence, as on previous occasions, with a notice of the career of the distinguished men lost to us by death, since the last anniversary.

OBITUARY.

Mr. WILLIAM JOHN HAMILTON.—By the decease of our former excellent President, Mr. W. J. Hamilton, Geography has lost an enlightened and zealous supporter, whilst I have to grieve for one of my best and most attached friends. Born in London (5th July, 1805), his education was commenced at the Charter House, and completed at Göttingen, where he acquired that facility in German which was of great use to him in his subsequent career.

His first pursuit in public life was diplomacy. He was attached to the mission at Madrid in 1827, in 1829 was removed to Paris as an Attaché to the Embassy, and subsequently became Précis Writer at the Foreign Office, under the Earl of Aberdeen. In this commencement of an active life, he very naturally followed the steps of his eminent father, Mr. W. Hamilton, so long distinguished as a diplomatist, and not less so for his learning and that love of fine art which rendered him in his latter days one of the most efficient of the Trustees of the British Museum. On our part, also, we must never forget that Mr. Hamilton, senior, was the first of our Presidents who delivered one of these Anniversary Addresses, which, since his time, have formed an integral and essential part of the volumes of our Journal. As soon as the father perceived that his son had

reached an age when his talents required to be directed to a special pursuit in Science, to be combined with Art, and which would elicit all his energy, he requested me to attract William's attention to Geology. In this way I had not only the satisfaction of giving my friend his first lessons on geology in the field (anno 1835), but also of making him known to the accomplished naturalist, the late Hugh Strickland; and soon after was formed the scientific and antiquarian project of these two fine young men, who embarked together with the noble intention of investigating the Bosphorus and Asia Minor. The son was thus enabled to gratify the wish of his parent in working out the comparative geography of these regions, whilst with his companion he was sure to unravel many phenomena in Natural History.

As respects Turkey in Europe, Hamilton and Strickland speedily threw a new light on the geological structure of the environs of Constantinople; but their friendly partnership was soon dissolved, for Mr. Strickland was compelled to return home on family affairs.

Left to himself, Mr. W. Hamilton carried out and completed that survey of Asia Minor, which, being published in 1842, justly obtained for him a high position among travellers, and elicited the warmest commendation of Baron A. von Humboldt. No one indeed can peruse these volumes, or examine the map which accompanies them, without being struck with the varied qualifications which our deceased associate brought to bear, in illustrating the geography, both physical and comparative, as well as the geology of this remarkable region. More recently, indeed, our Honorary Member, M. Pierre Tchihatchef, after several excursions in Asia Minor, has produced a more complete map, particularly as regards geology; but still, I am sure that my eloquent Russian friend will unite with me in admiring the previous efforts of Hamilton. In fact, the minute notice of every mile on his route, as noted in his Itinerary, the exact time of departure and arrival, the constant observation of each turn of the road with compass in hand, and the minutest notice of every natural feature, was an earnest of what this most persevering and conscientious man was destined to be through life.

In the year 1843 Mr. Hamilton was honoured with the Founder's Medal of the Society for these researches in Asia Minor; and it is a remarkable fact that he and the lamented and excellent Admiral Smyth are the only Presidents who, since the foundation

of our Society, have received our Gold Medals for actual journeys and discoveries in geography.

In the sister science of Geology Mr. Hamilton was distinguished, not only as a good sketcher and a clear writer, but also as having been so much looked up to by his associates, that having presided over the Geological Society from the years 1854 to 1856, he was again chosen President in 1864, and served till 1866. Besides his Anniversary Addresses, which are models of accurate research, he had in previous years been of signal use to the Geological Society, by acting as Secretary and Foreign Secretary. His great merits in all these capacities have, indeed, already had justice done to them by Mr. Warington Smyth, the late President of the Geological Society.

In the years 1837-41-42 and 1847, Mr. Hamilton acted as the President of this Society, and his Anniversary Addresses were distinguished by the perspicuous observations with which they were filled, whilst it was his constant and earnest endeavour to improve and fix the principles and regulations by which we have ever since been governed.

In his last Address, when speaking of the means by which the advancement of geographical science was to be best attained,—some persons being of opinion that we should confine ourselves entirely to purely scientific subjects, others preferring descriptive travels and more amusing topics,—Mr. Hamilton very wisely condemned such exclusive practice, and thus left it recorded:—"They whom I am now addressing will probably agree with me, that it is only by a complete union of scientific truth with popular interest, that we can hope to see the science of geography take that hold of the public mind in this country, which shall ensure it the support necessary to secure its efficiency and to maintain it in a healthful and powerful condition."

This principle you well know, gentlemen, has ever guided me since I first presided over you; and it is unquestionably through its steady application that our members have risen from 668, when Mr. Hamilton last presided, to our present potent cypher of 2150 Fellows.

In a public capacity Mr. Hamilton represented the borough of Newport, in the Isle of Wight, in the Conservative interest, from 1841 to 1847. In later years he devoted himself assiduously to the cultivation of several branches of geology, and by a patient study of

conchology became an adept in his acquaintance with all tertiary fossils, as testified by various memoirs published in the Quarterly Journal of the Geological Society.

As a President he was highly esteemed for the fidelity, urbanity, and integrity with which he discharged his duties, in the course of which he made many sincere friendships; and I can truly testify that his death, which alas! came upon him at much too early a period, was as deeply lamented by geologists and geographers as it was by a large body of private friends. In addition to his scientific pursuits, Mr. W. Hamilton was an excellent man of business, whether as member of Committees of the House of Commons, or as Chairman of the Great India Peninsula Railway Company, with which body he was connected from the year 1849 till his death on the 27th June, 1867.

He was twice married. By his first wife, Miss Margaret Trotter, to whom he was united in 1832, he had one son, now Lieutenant-Colonel Robert Hamilton, of the Grenadier Guards. By his second wife, the Hon. Miss Margaret Dillon, he has left three sons and four daughters, all surviving; and who, with their excellent and affectionate mother, deeply deplore their loss.

Among the scientific distinctions of Mr. W. Hamilton, it is to be noted that he had not only presided with credit over the Royal Geographical and Geological Societies, but that he was also a Fellow of the Royal Society, and a Honorary Member of various Foreign Scientific bodies.

The EARL of ROSSE.—By the death of this nobleman, Science has been deprived of one of her most illustrious cultivators,—one who, by his marvellous skill and perseverance, constructed a telescope of such power that he was enabled to open out a long vista through the distant heavens, and make observations of celestial bodies, of which mankind had hitherto been entirely ignorant. By means of his gigantic instrument, astronomers have been able to examine those remote nebulous bodies which seem to be in a transitionary state, or as the germs of future planetary systems; and thus we peer into the innermost secrets of Nature, and aid is lent to the sister science of Geology by the light thrown on the subject of the origin of the planet on whose surface we live.

It would be presumptuous on my part to attempt to do justice to the services rendered by Lord Rosse to Astronomy; the more so as they have been admirably expounded by the Rev. Dr. Robinson, the celebrated astronomer, from whose sketch of the career of his

lamented friend, in the Obituary of Fellows of the Royal Society, I derive the following details :—

William Parsons, third Earl of Rosse, was born at York on the 17th of June, 1800, of a family which had been settled in Ireland from the time of Elizabeth. He was educated at home by a private tutor, and, when eighteen years old, entered Trinity College, Dublin. Although his career there was eminently successful, he did not graduate, but went to Oxford, where he entered Magdalen College, and, on leaving the University, commenced public life as the representative of King's County in Parliament. His political career was intermitted at the end of eight years, in order that he might devote himself with more freedom to his favourite scientific pursuits, and discharge more completely the duties of a landed proprietor, which he did most conscientiously. But, although kind and considerate as a landlord, he was not the less resolute in supporting the authority of law and putting down the murderous societies which were the terror and curse of that part of Ireland. This, of course, made him a mark for the assassin. He knew his danger; but the knowledge neither made him shrink from his duty, nor embittered his feelings against the misguided people who were conspiring against him. This continued until the time of the famine, which crushed under the weight of real misery the imaginary grievances of the agitators, and showed them who were their real friends. None stood the test better than Lord Rosse, who, during some years, applied nearly all the income of his Irish property to relieve the unhappy sufferers. This told on their hearts, and they thenceforward became proud of his increasing fame, and regarded him as an honour to their nation. He was elected an Irish Representative Peer on the death of his father in 1841; and previously, in 1831, he had been appointed Lord Lieutenant of his county. In 1836 he married Miss Field, a partner worthy of him, who sympathised in his pursuits, and even mastered enough of astronomy to help him in his calculations.

Although most widely known as an astronomer, Lord Rosse was by no means exclusively devoted to this science. In fact, few minds of our day have grasped so wide a range of knowledge. He was skilled to an extraordinary degree in mechanics, and applied his abilities, as is well known, with unusual patience and success to experiments on the casting and polishing of metallic specula for the reflecting telescope. He was a good chemist, and would have attained a high position as a civil engineer, if he had devoted himself to this profession. He was also a master of political economy,

and devoted for years much attention to the great question of national education, and the loss of his authority on that subject is deeply felt in Ireland at the present day.

Independently of the great telescope at Parsonstown, constructed by himself, Lord Rosse's chief titles to scientific fame are furnished by the memoirs he contributed to the Royal Society, and which were published in their 'Transactions' for 1840, 1850, and 1861. It would be foreign to my present purpose to detail the processes by which, through many years' well-directed labour, he arrived at the completion of his renowned instrument. Suffice it to say, that his attention was first directed to this subject in 1826, and it was not before 1845 that his efforts were crowned with success, and his mighty telescope so far complete that he was enabled, on the 13th of February in that year, to make, in company with his friend Sir James South, his first observation of the celestial bodies. Since then, however, he continued to improve the instrument for many years.

With all his scientific merit, the Earl of Rosse was also a model man in his social qualities; his conduct being guided by the highest moral principles. Those who, like myself, were attracted to him by old personal friendship when visiting him at his seat in Ireland, and seeing how he enjoyed the companionship of his estimable Countess, and how wisely he instructed his children, could not fail to love him as much for his kindheartedness and simplicity of character, as they admired him for his great acquirements. It is, indeed, a source of the greatest satisfaction to the numerous friends of the late Earl, that he so brought up his sons that his successor has already, by new discoveries in astronomy, given us the assurance that he is a worthy inheritor of the name of his illustrious father.

Intimately dependent as Geographers are upon Astronomers, I reflect with some pride on the fact, that this eminent cultivator of the sister science was so long connected with our Society, having been elected in 1844, on being introduced by myself; and I well know how warm was the interest he took in our prosperity.

Lord Rosse was President of the Royal Society from 1848 to 1854; and in 1862 was elected Chancellor of the University of Dublin.

His appearance promised a long life, but an accident, so trifling that it was neglected till too late, broke down his strength and brought him to his end. A slight sprain of the knee produced, after

some months, a tumour, which was ultimately removed by a severe operation. The wound was slowly healing, but he sunk under the process; and, on October 31st last, he died as he had lived, patient and uncomplaining under his long and acute suffering, gentle and considerate to all around him, and strong in Christian hope.

Admiral Lord COLCHESTER.—By the decease of Lord Colchester, our Society has lost one of its most earnest supporters, who, having joined us in 1838, and having during many years assisted us by his advice as member of the Council, was during the years 1846 and 1847 the President of our body.

Lord Colchester was born in 1798, and educated at Westminster School. He entered the navy in 1811, and served successively on board the *Revenge*, Admiral the Hon. A. Legge, in the Mediterranean, the *Bacchante*, Captain Hoste, in the Adriatic, and later, during the hostile operations of the year 1814, on the coast of America. Between these two periods of service he completed the theoretical part of his naval education at the Naval College at Portsmouth. In 1816 he joined the *Alceste*, which conveyed Lord Amherst and his embassy to China. On arriving in that country he occupied a place in Lord Amherst's suite, and accompanied him to the palace of Yuen-men-yuen, near Pekin, since rendered famous by its destruction at the hands of the British troops in the last war, and returned with the Ambassador through the interior of China to Canton. He also drew the sketches contained in the history of this embassy by Sir Henry Ellis. He was further employed in making a plan of the River Yang-tsze-Kiang, and it was this acquaintance with the internal water-communications of this great region which enabled him, as we shall presently see, to render a great service to his country, by a plan which he communicated in 1840 for the invasion of China, and which was eventually adopted with most successful results by the Earl of Ellenborough when Governor-General of India.

Obtaining the rank of Lieutenant in 1817, he again, in 1818, went to sea, on board the *Liffey*, Captain the Hon. H. Duncan, and visited the West Indies, the Baltic, and Mediterranean. On obtaining the rank of Commander he was appointed to the *Racehorse*, and was in the Levant during the Greek war of independence. As Commander of the *Columbine* he was, subsequently, again in the same part of the world. During these cruises he made an examination of the harbours of the Gulf of Kolohythia, and in 1826 received his commission as Post-Captain. After the death of his father and his succession to the Peerage he was appointed to the command of the *Volage*, and pro-

ceeded to the South American station, whence he made a voyage to Europe to convey the Emperor and Empress of Brazil to Cherbourg. On the completion of this duty he returned to his station and visited both the eastern and western coasts of South America, making an inland journey to Arequipa when off the coast of Peru. Subsequently, during the Belgian revolution, the *Volage* was despatched to the North Sea, and, on the surrender of the citadel of Antwerp, recalled home. With this closed Lord Colchester's active service; for, having afterwards devoted himself to Parliamentary duties, he never again held a command afloat, and became in course of time an Admiral on the reserved list.

In his parliamentary career Lord Colchester consistently adhered to the Conservative interest, and spoke occasionally, from his first session in 1833, both on naval and general topics. On the approach of the Chinese war in 1839 he drew up a plan, which he had long previously conceived, for intercepting the interior communications of the empire by sending a fleet up the Yang-tsze-Kiang. He consulted on this subject the veteran Chinese scholar Sir George Staunton, who strongly approved of it, and it was placed in the hands of Lord Palmerston, the Foreign Minister at that period; but nothing beyond a preliminary survey of the mouth of the river was then undertaken, and it was reserved for the new ministry, after the change of government in 1841, to profit by the suggestion. Lord Colchester's map of the Yang-tsze-Kiang, relating to the course of the river between the entrance of the Great Canal and Nankin, was engraved by the Admiralty, and when Lord Ellenborough was appointed Governor-General of India he sent reinforcements in March, 1842, to Sir Hugh Gough and Sir W. Parker, with orders at once to proceed to action on the Yang-tsze. The capture of Tching-Kiang-Foo, at the junction of the canal with the great river, closed the struggle, and Lord Colchester's claim to have aided in winning this triumph for his country was fully recognised by the Governor-General, who carried his suggestions into execution.

On the formation of Lord Derby's first administration, in 1852, Lord Colchester was appointed to the united offices of Paymaster-General and Vice-President of the Board of Trade. In 1853 he received the honorary degree of D.C.L. from the University of Oxford, and in 1858, Lord Derby being again Prime Minister, he was appointed to the office of Postmaster-General. He discharged the duties of that office with great industry; but, unhappily, at this time his general health underwent a deterioration, of which the principal

symptom was a swelling of the leg, from which he never completely recovered. He continued, however, to attend the House and exert himself in behalf of the various charitable institutions with which he was connected as Chairman, until 1866, when his health was further undermined, and from February, 1867, to his death, which took place on the 18th of October last, he was almost entirely confined to his bed.

Lord Colchester married in 1836 Elizabeth Susan, second daughter of the first Lord Ellenborough, by whom he had an only son, the present Lord, who as one of our young associates is, I trust, destined to fill the post so worthily occupied by his excellent parent, whose modest and retiring manners, accomplishments and good sense, accompanied as these qualities were by the truest kindness and the highest sense of honour, endeared him to every one who knew him.

The Right Hon. Sir George CLERK.—By the death of this useful and highly-respected man, in his eighty-first year, I have lost a friend with whom I began life fifty-two years ago, and whose many good qualities I have never ceased to esteem during that long period.

For many years he was the representative in Parliament of his native county of Edinburgh, and he would doubtlessly have continued to enjoy that honour to the day of his death, had not the Reform Bill of 1832 entirely broken up the old social system on which Scotch society had been based for centuries. That Bill, which was a salutary reform in England, produced a complete revolution in Scotland, where up to that day landed proprietors only who were possessed of a certain rental returned the county member, who was thus chosen as the true representative of their broad acres. Such has been the change resulting from this Act, that the landed proprietors have to a very great extent lost their legitimate influence. But whilst Sir George was ever a Conservative in politics and occupied several public offices of mark, he steadily supported Sir Robert Peel when that great statesman felt it to be his duty to abrogate the Corn Laws.

Among the public offices he filled, Sir G. Clerk had been Secretary of the Treasury, Vice-President of the Board of Trade, Master of the Mint, and for many years the so-called "Whip" of the old Tory party in Parliament.

Sir George Clerk was a true lover and patron of the Fine Arts, and was noted through life as a warm supporter of the Academy of Music

and all good musical meetings, as well as the supporter of many a promising proficient in the art.

He was also much attached to our Science of Geography and its Natural History applications, having been a Fellow of our body since our foundation, and having acted during the last six years of his well-spent career as President of the Zoological Society.

He married Miss Maria Law in 1810, and this very estimable lady, who bore him twelve children, predeceased him only by one year. He is succeeded by his eldest son, now Sir James Clerk.

Captain James MANGLES, R.N.—As one of the scientific officers of the Navy, Captain Mangles well deserves to be favourably noticed on this occasion, particularly from the interest he had always taken, during a long life, in the advancement of geographical science. He entered the Navy so long ago as the year 1800, and for several years saw much active service in various parts of the world, on board the *Narcissus*, 32 guns, under Captain Ross Donnelly. Subsequently, as Lieutenant of the *Penelope*, he aided in the reduction of Martinique in February, 1809, and bore his share generally in the naval enterprises of those stirring times until 1815, when, having attained the rank of Commander, he retired on half-pay.

I formed an acquaintance with Captain Mangles as early as the year 1816, when he was travelling in Italy on his way to the East with his companion and brother officer, the Hon. C. L. Irby. The results of their tour were published under the title of 'Travels in Egypt, Nubia, Syria, and Asia Minor,'—a work that soon attained a wide popularity. Since then he devoted a great portion of his time to the study of Geography and Hydrography, and published at intervals several treatises, which evince his zeal in the study of these sciences: such were his 'Geography, Descriptive, Delineative, and in Detail,' his 'Illustrated Geography and Hydrography,' and others. He was elected Fellow of the Royal Society in 1825, and was one of the earliest Members of our own body, having been enrolled in 1830. His death took place on the 18th of November last.

Mr. Ashurst MAJENDIE.—One of our original members, Mr. Ashurst Majendie, the proprietor of Castle Hedingham, in Essex, was a man of considerable knowledge and of a very inquiring mind. To geographers he was chiefly known as the brother-in-law of Lady Franklin, and for the lively interest which he took in advocating, with myself and others, the search after the great Arctic hero.

Mr. John Minet LAURIE, of Maxwelton House, Glencairn, was

known as a profound historian. He formerly sat in Parliament for Dover, and for Maidstone. He was elected a Fellow of the Royal Geographical Society in 1861, and died on the 25th of February, 1868, in the fifty-sixth year of his age.

Rev. Pierce BUTLER.—By the death of the Rev. Pierce Butler, rector of Ulcombe, Kent, we have lost, in the prime of life, an associate who was a true Geographer at heart, and an experienced traveller, and who, for some months prior to his death, devoted a large share of his time and energies to a project for a survey of the peninsula of Sinai, with a view to extending our knowledge of Biblical geography.

Mr. Butler was born in 1826, and was the third son of Lieutenant-General the Honourable Henry Edward Butler, and grandson of the third Earl of Carrick. He graduated at Trinity College, Cambridge, in 1848, and soon afterwards took holy orders. At the close of 1853, his eldest brother, Captain H. I. Butler, of the 55th Regiment, an officer of great ability and promise, received special leave of absence from Government for the purpose of exploring a portion of the peninsula of Sinai, and, attracted by this opportunity of visiting, in his brother's company, a country in which from boyhood he had ever felt the deepest interest, Mr. Butler resolved to go with him. Their preliminary researches led them to the conclusion that a careful survey and systematic examination were essential to the solution of the many interesting problems of the peninsula. This task had scarcely been commenced when news reached them of the outbreak of the war with Russia; and Captain Butler, obeying the call of duty, relinquished his interesting work, and sailed eastward from Alexandria in April, 1854, to join the expeditionary army. Mr. Butler, after visiting the Holy Land and Constantinople, returned, at the end of May, to England; but the soldier-brother was destined never to follow him, for, ere the year was out, his friends at home received the sad intelligence that he had fallen on the battle-field of Inkerman, whilst serving on the Staff of the First Division of the army. On the 21st of the preceding June, another gallant brother, Captain James Armar Butler, the intrepid "hero of Silistria," had died of wounds received during that memorable siege —struck down in the height of a career so brave and so distinguished that the sorrow his father and friends felt at his death was shared, as Lord Hardinge feelingly expressed it, "by the country, the army, and the Sovereign."

Two noble brothers had thus fallen in their country's cause within

the short space of five months; and now, Pierce Butler himself, animated by that chivalrous spirit which was one of the finest traits of his character, determined to go out at once to Turkey, for the special purpose, amongst others, of volunteering his ministrations to the sick and wounded soldiers of our army, in whatever sphere they might be most acceptable: he felt, indeed, that some such useful Christian service was the most fitting tribute he could offer to the memory of his lamented brothers. He accordingly proceeded to Constantinople in December, 1854, and shortly afterwards accepted the offer of an appointment as one of the chaplains to our army in the East. In discharging this voluntary duty his gentle, genial manners and amiable disposition won the hearts of officers and men; and those now living who were present with the Second Division in the camp before Sevastopol, must retain a clear and grateful recollection of his ministrations.

At the close of the Crimean war Mr. Butler resigned his appointment as chaplain, and for the next five years was a constant traveller in America and in many parts of Europe. In 1861, he was presented to the rectory of Ulcombe, near Staplehurst, a living in the patronage of his family, which he held until his death; and in the same year he married. In the retirement of a country life, the interest which his visit to the Desert of Sinai in 1854 had created was ever prominently before him, and to carry out, if possible, the work of survey and exploration in that region, which his gallant brother had been so reluctantly compelled to relinquish, was the one object which, of all others, he was most desirous to effect. Encouraged by the assistance which Government had afforded towards the recent survey of Jerusalem, he determined last year to endeavour to obtain, from amongst his own relatives and friends, and other persons likely to take an interest in Biblical and geographical research, sufficient funds for a topographical survey of at least the most interesting portions of the peninsula of Sinai; and, if successful in this, to solicit the aid of Government in its execution. In a few weeks he had obtained so many liberal promises of support from noblemen and gentlemen interested in the subject as to justify him in laying his plan before the Secretary of State for War. Sir John Pakington readily lent his aid, and at once authorised Sir Henry James to undertake the superintendence of the Sinai survey, as he had formerly done of the survey of Jerusalem, and to equip and send out an

officer and a small party of the Royal Engineers, when the necessary funds should be forthcoming. Lord Stanley, as the head of the Foreign Office, also afforded the scheme every facility in his power, and Mr. Butler, confident then of ultimate success, prepared to pay a short visit at once to Egypt, with the view of making preparatory arrangements for the arrival and progress of the surveying party, which it was proposed to despatch from this country in the coming autumn, and which he himself hoped to accompany. He had even taken his passage for Alexandria, and was actively preparing for departure, when severe illness overtook him; and on the 8th of February,—on the very day, and almost at the very hour, on which he was to have started for Egypt,—he died at his home in Kent, ere he had quite completed his forty-second year.

Mr. Butler's loss is mourned by many who valued and shared in his zeal for the cause of Biblical Geography, as well as by a large circle of personal friends, to whom he was endeared by the attributes of a true and high-minded Christian gentleman. There is something touching and even mysterious in this history of two brothers, both removed at a comparatively early age* by death, when on the eve of carrying out the project in which both felt so keen an interest, and which both strove so hard to accomplish. It is, however, earnestly to be hoped that this useful undertaking will not be permitted to drop; and Captain Palmer, of the Royal Engineers, to whom had been entrusted the detailed work of the proposed survey, and to whom I am indebted for this sketch of Mr. Butler's career, informs me that there are many amongst Mr. Butler's friends who are most desirous to carry it to a successful termination. The Rev. George Williams, of King's College, Cambridge, and the Rev. F. W. Holland, already well known as a traveller in the Sinaitic peninsula, have both volunteered their aid and co-operation to push forward this work. It may be truly said that, whoever may henceforward be the active promoters of this enterprise, and whatever may be the measure of ultimate success which awaits it, it is one with which most assuredly the name of Butler must ever be closely and honourably connected.

Sir Charles LEMON, Bart.—By the decease of Sir Charles Lemon I have lost another old friend, who has left behind him a character which for high principles, benevolence, and friendliness, has never

* Captain H. J. Butler also died in his 42nd year.

been surpassed. In a word, no man of my time was ever more generally respected and beloved.

He was born in the year 1784, and dying on the 12th February of this year, he was then consequently in his eighty-fourth year.

In 1810 he married Lady Charlotte Strangways, youngest daughter of the second Earl of Ilchester, by whom he had one son only. The fond parents having a presentiment that their boy might meet with his death on the water, selected Harrow School as the place of his education, because there was not, as at Eton and other places, a river near it. Yet, to their intense grief, the youth was there drowned in a pond! and the shock was so great that the affectionate mother never recovered from it.

Sir Charles Lemon was for many years the representative in Parliament of his native county, Cornwall, and was ever a consistent supporter of the old Whig principles. As a magistrate and country gentleman he seized every opportunity of promoting works of usefulness and charity, and at his hospitable mansion of Carclew his fine social qualities were heartily appreciated by all those who, like myself, have passed enjoyable and pleasant days there.

Sir Charles Lemon was much attached to Science, particularly to those branches of it which related to or improved the mining operations of his own county. In the year 1846, being President of the Royal Geological Society of Cornwall, he invited me, his guest, to attend an anniversary meeting of that body and say something which might give encouragement to the tin-miners, who were at the time in a suffering state, and many of them out of work. It was then, referring to what I had been speculating upon in our own Society and at other places in the two previous years, as to the auriferous character of the Australian rocks, when compared with those of the Ural Mountains, that I ventured to counsel these tin-miners to emigrate to Australia and dig for gold. Some of them took my advice, and in 1848 I was in possession of small specimens of gold ore sent home by them. Thereon I took more courage and warned Her Majesty's Government of the great event which was about to be fulfilled. I will only add that the so miscalled *discovery* of gold, *i. e.* the diggings on a profitable scale, were not opened out till 1851, and that my much earlier letter to the Colonial Secretary is printed in the Blue Book on Gold.

Sir Charles Lemon was elected into our Society in 1836; he was also a Fellow of the Royal and Geological Societies, and the Presidents of these bodies will, I am sure, be as ready as myself

to testify to the high worth of so excellent and accomplished a man, and such a choice specimen of a thorough English gentleman.

Mr. John CRAWFURD, F.R.S.—By the recent death of this enlightened and excellent man, on the 11th instant, I was plunged into a profound sorrow—a sorrow shared, I am sure, by everyone who knew him, and particularly by the Fellows of the Royal Geographical and Ethnological Societies, as well as the members of the Athenæum Club.

Born in the island of Islay, in 1783, he was in his 85th year when he was most unexpectedly carried off by an attack of inflammation of the lungs. For, although he had reached a ripe old age, he had preserved his habitual sound health, and had applied to the last the full vigour of his strong mind in so genial a manner, that he occupied a position among us which was unrivalled, and makes us all deeply sensible of the sad loss we have sustained.

To attempt to do justice in this short notice to the various merits of John Crawfurd—whether as a great traveller, an accomplished Oriental scholar, an able administrator, a sound geographer and ethnologist, and an accurate statist—is wholly beyond my power. Few men, indeed, of this century have passed away whose deeds more imperatively call for a faithful and full biography. Earnestly hoping that such a work may be undertaken by some competent person among his numerous friends and admirers, I can only briefly advert to some salient points of character in the long, distinguished, and useful career of my lamented friend.

Having studied medicine for three years at Edinburgh, he went to India in 1803, as an Assistant Surgeon in the Company's military service, and was almost immediately immersed in active duties. Thus, he served under Lord Lake, when that General invaded the dominions of Scindia, and was also present at the siege of Delhi. In the following year he accompanied Colonel Monson's force in the advance to Ougain and in its retreat before Holkar's army; and we have still happily among us a fresh and vigorous veteran Indian soldier—Colonel Sykes—who informs me that in February, 1805, he knew Crawfurd when he was in medical charge of twelve companies of Sepoys in the beleaguered fortress of Rampoora.

After five years of service in the North-western Provinces of India, he was transferred to Penang, where he commenced those studies of the Malay languages and people which enabled him

eventually to compose that remarkable work the 'Malay Grammar and Dictionary.' In 1811 he was selected by Lord Minto to accompany him in the great expedition which led to the conquest of Java. There, as a diplomatist, he represented the British Government for nearly six years, during which he made extensive journeys and voyages, and amassed those diversified materials in Ethnology, Natural History, and Geography, which, after his first return to England in 1817, he published in 1820 under the title of 'History of the Indian Archipelago.'

Going back to India in 1821, he was appointed by the then Governor-General, the Marquis of Hastings, to the diplomatic mission sent to Siam and Cochin China; and on this occasion he obtained the highest credit from the Indian Government. It may be affirmed, indeed, that during his Indian services all leading public men sought for his counsel and advice; and I might enumerate the names of a host of eminent authorities, including Colebroke, Mountstuart Elphinstone, and many others, who were his intimate friends and correspondents.

From 1823 to 1826, acting as Governor of Singapore, after the retirement of Sir Stamford Raffles, he became the second founder and wise administrator of that colony, which, through his sagacious arrangements with the neighbouring chiefs, was raised into the highly important position it has ever since maintained.

In addition to the highly valuable commercial and other statistics registered by our deceased Fellow, in relation to which his name stands out in gazetteers throughout the world, he never neglected any branch of natural knowledge. Thus it was that, in his voyage up the Irrawady to the capital of Ava, in 1826, he collected those fossil bones of Mastodon, large Tortoises, and Crocodilia, &c., which were described by Dr. Buckland and Mr. Clift, and which gave to the former the opportunity of generalising on the important fact, that there existed in the Indian regions formations analogous to the tertiary and superficial deposits of Europe.* It was when these remarkable collections were the admiration of geologists, that I became better acquainted with Mr. Crawfurd; and from that day, now forty-two years ago, our intimacy strengthened with each succeeding year.

For some time, indeed, after his return from India, he was more immersed in political affairs than harmonised with my own special

* See 'Transactions of the Geological Society,' second series, vol. ii. p. 377.

occupations. Thus, with his large and liberal views on the subject of Free Trade, he took an active and influential part in the support of his friend Mr. Joseph Hume, in breaking up the old commercial monopoly of the East India Company, and mainly helped to bring about that great fall in the price of tea, and other necessaries of life, which has proved such a blessing to the masses of the people. It is also known to me that Mr. Cobden highly estimated the efforts of Mr. Crawfurd in favour of Free Trade, particularly as shown in an article of the 'Westminster Review' of 1832.

He made two efforts, shortly after the passing of the Reform Bill in 1832, to obtain a seat in the House of Commons for two Scottish places—Glasgow and the Stirling burghs—but was unsuccessful. I have often rejoiced at these political failures; for, from that moment the strong mind and untiring energy of the man were devoted almost exclusively to his favourite topics of philology, ethnology, geography, and statistics; the fruits of his laborious studies first appearing in the 'Malay Grammar and Dictionary,' the preliminary Dissertation to which is a remarkable work in itself. Tracing the affinities of a vast number of the languages of the Indian Archipelago, and even in parts of the Pacific, to the Malay root, he ascribed this wide diffusion to the insular character of this vast region. His first-rate merits as a philologer have indeed been canonized in the writings of William von Humboldt in his great work 'Über die Kawi-Sprache auf der Inseln Java.' In it the illustrious Prussian expressly stated, that without the valuable contributions of Mr. Crawfurd, he could never have succeeded in mastering the Javanese and Kawi languages, and he expresses the very great obligations of his brother Alexander von Humboldt and himself for the highly valuable contributions of our deceased Associate. In 1856 he published his 'Descriptive Dictionary of the Indian Islands and adjacent Countries,' which was in fact the completion and extension of his original work of 1820. This book, illustrated as it is with a most interesting map of the Asiatic Archipelago, is a striking specimen of the great capacity of the author. In it we find condensed in an octavo of 459 pages a surprising amount of accurate geographical, ethnological, and statistical knowledge.

First presiding over the Ethnological Society in 1861, he continued to be the life and soul of it to the day of his death. In fact, he gave to this body quite a new impetus, and astonished even his most intimate friends by his unceasing contributions on the prodigious variety of subjects which he skilfully connected with his

favourite science. The mere enumeration of the titles of these memoirs, as given in the appended footnote—all produced in seven or eight years—is a wonderful proof of the capacity, versatile power, and energy of an author who could bring out all these works between his seventy-eighth and eighty-fifth year.* Including his frequent contributions to reviews and weekly newspapers, particularly the 'Examiner,' Mr. Crawfurd has perhaps written more than it has been given to any one author of this century to accomplish. I may here also observe, as a striking illustration of the logical accuracy of his thoughts and the strength of his memory, that his writings on the statistics of commerce, geography, philology and ethnology scarcely ever required a correction of his pen; for they exhibit fewer erasures and alterations than are to be seen in the original manuscripts of Walter Scott, or any other author, even of works of fiction.

Personally I have to acknowledge with gratitude the contributions he made to several of my Anniversary Addresses, whenever it fell to me to allude to India or its great Archipelago, and on this very occasion I am indebted to him for the article on Burmah.

Yet, with all this incessant literary labour, he found time to read extensively, and store up in his surprising memory all the knowledge that he had ever acquired. He also found leisure to hold much social converse with many friends, both young and old; and few of the members of the Athenæum Club will now enter

* Out of the thirty-eight memoirs contributed by Mr. Crawfurd to the 'Journal of the Ethnological Society,' I may mention the following:—'On the Connexion between Ethnology and Physical Geography;' 'On Numerals as Evidences of the Progress of Civilisation;' 'On the Antiquity of Man from the Evidence of Language;' 'On the Commixture of the Races of Man as affecting the Progress of Civilisation;' 'On Colour as the test of the Races of Man;' 'On the Relation of the Domesticated Animals to Civilisation;' 'On Language as a test of the Races of Man;' 'On Lyell's Antiquity of Man,' and 'Huxley's Evidence on Man's Place in Nature;' 'On the Sources of Tin for Bronze Tools and Weapons of Antiquity;' 'On the supposed Infecundity of Human Hybrids or Crosses;' 'On the supposed Stone, Bronze, and Iron Ages of Society;' 'On the so-called Celtic Languages in reference to the question of Races;' 'On Cannibalism in relation to Ethnology;' 'On the Physical and Mental Characteristics of the Negro;' 'On the Origin and History of Written Language;' 'On the Ancient Hindu Sacrificial Bell found in the Northern Island of New Zealand;' 'On the Invention of Writing Materials in reference to Ethnology;' 'On the Migration of Cultivated Plants in reference to Ethnology;' 'On Cæsar's Account of Britain and its Inhabitants;' 'On the History and Migration of Cultivated Plants;' 'On the Dissemination of the Arabian Race and Language;' 'On the Migration and Cultivation of Saccharifierous Plants;' 'On the Plurality of the Races of Man;' 'On the Animal and Vegetable Food of the Nations of Australia in reference to their Social Position;' 'On the Classification of the Races of Man according to the form of the Skull;' 'On the History and Migration of Cultivated Plants and on Condiments;' 'On the Antiquity of Man' (second memoir); 'On the Ethnology of Abyssinia and adjacent Countries,' read Nov. 12, 1867. Since the contribution of the last of these memoirs to the volumes of the Ethnological Society, Mr. Crawfurd has read certain others, including one on his objections to the Darwinian theory, another on coffee and other plants, and has left sixteen other manuscript papers behind him.

its great vestibule, in which he was generally to be seen in the afternoon, without mournfully regretting the absence of the cheerful countenance and friendly grasp of the hand of dear John Crawfurd.

Let me add that he was equally popular with the gentler sex, who could not fail to be attracted to him by his genial address and his happy and simple manner of conveying information. Well has it been said by an able writer in the 'Times'* who commemorated his deeds, that "all the members of the Geographical and Ethnological Societies will miss the tall form of the evergreen veteran, who scarcely ever failed to take part in their discussions, and who, while stoutly maintaining his own views, showed a forbearance and courtesy which might well be imitated by all members of learned Societies."

So deeply were his feelings and sympathies bound up with our meetings, which he so often enlivened by his good humoured criticisms and wise cautions, that during his last and fatal illness, when his mind was wandering, he was frequently speaking volubly as if he were addressing our Society, with kind allusions to his associates.

As a Highlander, I am proud that Islay should have produced such a man as John Crawfurd; and when his remains were consigned to the grave on Monday last, it was a solace to my heart to see many true friends assembled to pay this last mark of respect to such a noble type of humanity.

Mr. Crawfurd was first married to Miss Robertson, who, losing her health in India, was coming home with her child when the ship was lost and all hands perished. He married secondly in 1820 the beautiful Miss Horatia Perry, daughter of Mr. James Perry. She died in 1855, leaving him one son, Oswald, now H. M. accomplished Consul at Oporto, and two daughters, Mrs. Mynors and Mrs. George Ramsay, to deplore the loss of the most affectionate of fathers.

In addition to the men who have passed away, and of whom I have treated as being distinguished in science and art or in the public service, are the following deceased Fellows:—

Mr. T. H. Alsager; Mr. Arthur Anderdon; Lieutenant J. B. Bewsher; Mr. Thomas Bigg; Mr. J. W. Church; Captain Creswell, R.N.; Mr. John J. Cowell; Mr. William Thomas Hodgetts Chambers; Dr. James French; Mr. Charles Fraser; Mr. J. L. Franklin; Mr. Nathaniel Gould; Mr. W. S. Harvey; Mr. Robinson Hudson; Mr. Andrew Henderson; Mr. John Jerdein; Mr. Charles Kean, the

* See 'Times,' May 13, 1868.

celebrated actor; Mr. A. O. Lloyd; Colonel Thomas McGoun; Mr. Colin J. Mackenzie; Mr. H. H. Morris; Captain Rochfort Maguire, R.N.; Mr. Duncan Macpherson; Sir Richard D. Neave, Bart.; Mr. James Price, M.D., &c.; Mr. William Reed; Mr. James Smith; Mr. R. S. Sutherland, R.N.; Mr. John Scott; Mr. William Scott; Mr. William Silver; Mr. Arthur Vardon; Mr. J. E. Worcester.

ADMIRALTY SURVEYS.*—The Hydrographical Surveys of the Admiralty on the Coasts of the United Kingdom, in the Colonies, and in Foreign waters, have progressed during the past year favourably and successfully; and the Naval Officers employed in carrying them out have displayed their accustomed industry and ability, as will be seen by the following brief sketch of the result

West Coast of England.—H.M.S. *Lightning*, under Captain E. J. Bedford, with three assistants, has been employed in a re-survey of the upper portion of the Bristol Channel, from the termination of the Cardiff Survey of 1866-7 to the upper limit of King Roads, where many changes were found to have taken place in the bank-edges and shoals—so much so, as to require a re-buoyage on the part of the Trinity Corporation. This survey having been completed, the *Lightning* has been laid up, and the force on the home coasts reduced for the present to one regular surveying-vessel.

East Coast of England.—Staff-Commander E. K. Calver, with two assistants, in the *Porcupine*, have continued their examination of last year on the Eastern Coast with a view to the correction and revision of the Charts and Sailing Directions. The Coast and Harbours from the River Humber to the North Foreland have now been minutely examined. The entrance of Harwich Harbour, where improvements have been carried out to increase the depth, has been re-surveyed, and a new survey has been executed of the Suffolk Coast from a little below Lowestoft to Orfordness. During the progress of this latter work a discovery, interesting from its apparent connexion with the Suffolk beaches, has been made, viz., the existence of a tract of nine square miles of shingle a short distance in the offing between Dunwich and Sizewell, being of the same character as that of the beach, opaque flint, though more angular from having been subjected to less attrition: this feature may be of interest to those who have made the origin and movement of sea-beaches the subject of their investigations.

* Communicated by Captain Richards, R.N., F.R.S.

Portsmouth.—Staff-Commander D. Hall, with a steam-launch and a small party consisting of a boat's crew, has been employed in the examination of the bar and shoals at the entrance of this important harbour. The entrance as far as Spithead, and westward beyond Stokes Bay, has been very closely and carefully sounded on a scale of 24 inches to the mile; and a re-survey of the harbour itself on a scale of 30 inches to the mile has been commenced, which had become absolutely necessary in connexion with the extensive Government works being carried out, and the dredging away of the banks in contemplation.

Channel Islands.—Staff-Commander John Richards, with one assistant, and with such means as the vessels employed in the fishery and pilotage establishments are able to afford, is still employed in completing this intricate and very necessary survey. During the past year they have surveyed the Ecrehos and Drouilles rocks and islets, together with the Ecrevière Bank, all of which form a continuous chain of dangers, 10 miles in length by 3 miles in width, lying nearly midway between Jersey and Cape Carteret, and which are necessarily included in the Admiralty Chart of Jersey, now in course of publication, on a scale of 4 inches to the mile.

The spacious channel between this extensive line of reef and the island of Jersey has also been closely sounded, and many hidden dangers, hitherto unknown, have been discovered and placed on the Chart.

FOREIGN SURVEYS.—*Mediterranean.*—Captain P. F. Shortland, with an able staff of assistants, in H.M.S. *Hydra*, was employed in the early part of the last season in surveying the southern and eastern shores of Sicily, carrying the soundings off to depths of 2000 fathoms. Later in the year they were employed in sounding the Malta Channel; and in September, in consequence of an imperative necessity for a knowledge of the depths between Bombay and the Red Sea—in connexion with a Submarine Telegraph to India—the *Hydra* was detached from the Mediterranean for this purpose. She left Gibraltar in October, amply provided with all the necessary material, passed round the Cape of Good Hope, and reached Bombay in January; and, by the month of March, Captain Shortland having been greatly favoured by weather, most ably and successfully completed this important service, having obtained positive depths, and brought up specimens of the bottom at short intervals in a direct line from Bombay to the Kooria Mooria Isles, and thence to Aden.

The *Hydra* is now making a few additional investigations of the

bottom in the Indian Ocean, and settling some doubtful positions *en route* to England, after five years' foreign service, and will be replaced in the Mediterranean by the *Newport*, a small screw surveying-vessel, fitting out under Commander G. S. Nares.

Strait of Magellan.—H.M.S. *Nassau*, Captain R. C. Mayne, C.B., with several experienced assistants, has been employed in examining the approach to this strait, and its eastern portion, including the First and Second Narrows as far as Cape Negro. Great progress has been made in this work under considerable difficulties of climate and almost constant gales of wind, rendering it a harassing and often hazardous service for boat-parties. The great changes, however, which have been found to have taken place since surveys of nearly forty years ago—and the necessity of meeting the increased requirements of navigation, by this route to the Pacific, for large steam and iron-clad ships—are conclusive evidences of the usefulness of this undertaking. Among other changes the Sarmiento Bank, extending several miles off Cape Virgin, has undergone a material alteration in its character; and a pinnacle rock, with only 3 feet of water on it, and which had been undetected in former surveys, has been discovered at a distance of two miles from the cape.

China Sea.—Staff-Commander J. W. Reed, in command of the *Rifleman*, and a not over-strong staff of assistants, have been indefatigable in their labours among the reefs in the China Sea during the past season. No less than nine dangerous and extensive coral-reefs in the main route have been carefully examined, and added to the Chart immediately on their arrival at the Admiralty, as also the Sea-Horse Bank at the north-western end of the Palawan Passage.

The position of the doubtful "Holme's Shoal," in the fairway of that passage, has likewise been examined and found free from danger. A close and complete survey of Rhio Strait has been executed, and so far extended to the south as to include the islands of the Linga Archipelago, and the various channels leading to the Strait of Durian, as far south as the Island of Missana. The South Channel into Penang, which had undergone considerable change, has also been resurveyed.

North China and Japan.—Commander E. W. Brooker, in H.M.S. *Sylvia*, with a full staff of assistants, has during the past year been chiefly employed on the coasts of Formosa, of which, until now, our surveys have been of a fragmentary and imperfect character.

The *Sylvia*, in addition to the survey of the coasts and ports of Formosa, has searched for, and pronounced not to exist, Harp Island

and Alceste Rock on its southern and eastern sides, and has settled the position of Botel, Tobago Island, not hitherto correctly placed in regard to Formosa.

On the voyage to China, Commander Brooker visited the Andaman Islands and Cocos Group, for the purpose of rectifying the geographical positions of certain points reported to be considerably in error, and which he accomplished. He then carried a line of soundings along the Coast of Martaban, through the Strait of Malacca, and up the China Sea, from Saigon to Hong Kong, with a view to the requirements of submarine telegraphy between Singapore and China.

The *Sylvia* has also visited the Pratas Reef, as a preliminary step towards the lighting, by the Chinese Government, of that important position which has proved so fatal a danger to the navigation of the China Sea.

A valuable report on the lighting of the Coast of China between Hong Kong and Shanghai has also been furnished by Commander Brooker, and there is reason to believe that the Chinese Government, with the able professional aid of its English agents and advisers, are about to take up this important matter in earnest.

The Serpent, Commander C. Bullock, has been usefully employed on the coast of Japan, examining the anchorages on the east and west coasts of Nipon, with a view to the selection of treaty ports. Commander Bullock has surveyed the ports of Hiogo and Oösaka in the Inland Sea, and Nanao Harbour on the west coast, and examined the entrance to Kagosima Gulf and the coast about Cape Chichakoff; and has been generally engaged in correcting errors, getting soundings, and adding to our as yet partial knowledge of the coasts of that extensive country.

West Indies.—Staff-Commander John Parsons, with two assistants, is carrying on the survey of the British West India Isles by means of small vessels or boats hired on the spot. Owing to the inexpensive system pursued, the work necessarily progresses somewhat slowly; but in no part of the world has more elaborate or more accurate and perfect work been performed than in this survey.

A very complete Chart of the Island of Montserrat, closely sounded to the edge of the steep land which forms its base, has lately been received from Staff-Commander Parsons; and an equally careful survey of the Island of Barbadoes has been now commenced. Some interruption to the survey has lately occurred, in order to make an examination of the various channels among the Virgin

Islands to ascertain whether any serious changes had resulted from the late earthquake disturbances, which appears from the report of Staff-Commander Parsons, and other naval officers on the station, not to have been the case.

The surveys necessary to arrive at a conclusion respecting the selection of a station for the West India Mail Service, in lieu of St. Thomas, have also engaged the attention of our naval surveyors; and up to the present moment they are still occupied on this service.

It must not be omitted to mention that much valuable hydrographical information has been received from naval officers generally, both on this and other stations during the past year.

To Captain R. V. Hamilton, of H.M.S. *Sphinx*, especially, we are indebted for a close examination of the channel between the Island of Santa Cruz and the Virgin Group subsequent to the late earthquakes in that neighbourhood; upon which occasion he obtained a series of deep soundings, which were very valuable, and furnished as well an interesting paper on the subject generally.

Commander Charles Parry, of H.M.S. *Cordelia*, has also succeeded in obtaining deep soundings between Jamaica and Cuba. Information of this nature is always valuable, and especially at the present time, when it is likely to be turned to practical account by the connexion of Florida with the Southern Continent of America by means of the Telegraph Cable.

The Gannet, Commander W. Chimmo, in addition to her duties as a ship of war on the West India Station, has been principally occupied during the past season in continuing the survey of the Island of Trinidad and adjacent mainland, which important work will have been completed in a very perfect way by the middle of the present year. During the summer and autumn of 1867, the *Gannet* visited and explored a considerable stretch of the Labrador Coast, in the interest of the Fisheries; the limits of this coast, hitherto very inaccurately laid down, were correctly determined, and several harbours and anchorages carefully surveyed, to the great advantage of the seafaring population of Newfoundland, who annually resort to the fishing-grounds of Labrador.

Newfoundland.—Staff-Commander J. H. Kerr, with two assistants and a hired vessel, is steadily progressing with the coast survey of this colony.

During the summer of 1867 these officers rendered great assistance in procuring soundings and tracing out the best course for the

submarine cable between Placentia Bay at the south end of Newfoundland, and Cape Breton, in Nova Scotia; as also in ascertaining the position and assisting in the recovery of the Atlantic Cable eastward of Newfoundland. Subsequently the survey of the coast of Concepcion Bay and the examination of the dangerous rocky ground in the vicinity of Cape Freels and the off-lying islands was proceeded with.

Bermudas.—The examination, which was undertaken principally with the view of discovering the exact capabilities of the numerous narrow openings through the reefs of this group, and ascertaining the depth of water over the reefs generally, has been completed, and the survey discontinued.

British Columbia.—Mr. Pender, Navigating Lieutenant, and two assistants, have been employed in continuing the survey of the inner ship-channels between Vancouver Island and the northern boundary of British North-West America near Fort Simpson. This work, which is essential to the safe navigation of a very intricate region, has progressed very satisfactorily, and, when completed, will be of great benefit to our ships of war and to the future commerce of these colonies.

Cape of Good Hope.—This survey, which is being carried on principally by shore parties, aided by a ship of war when one can be spared by the officer commanding the station, is under the charge of Mr. W. E. Archdeacon, Navigating Lieutenant, and is now completed as far eastward as the Kei River, after long and laborious operations extending over many years. The whole of the coast from the Cape of Good Hope almost to the Kei River, a distance of 500 miles, is now published for the use of the seaman on a fair navigating scale, together with plans of every anchorage which is available between Simon's Bay and Natal.

AUSTRALIA.—*Victoria.*—The coast of this colony has been surveyed for some distance west of Cape Otway, with many additional soundings obtained off Ports Phillip and Western, and the survey is now being continued eastward between the latter port and Wilson Promontory. There has been some unavoidable delay in its progress, owing to the illness of Commander Wilkinson, which terminated in the death of that lamented officer in December last; by which sad event the navy has lost a most able and zealous officer, and the surveying branch of it one whose whole professional life had been conscientiously spent in its service.

New South Wales.—Captain Sidney and his assistants have made

their customary good progress with the survey of the shores of this colony. The coast-line between Sydney and Ulladulla, a distance of 112 miles, has been completed, together with the re-surveying of a great part of Broken Bay, and a plan of Jervis Bay, 80 miles southward of Sydney.

South Australia.—Commander Hutchinson and his two assistants have been employed during the past season on the coasts of Yorke Peninsula, which separates the Gulfs of St. Vincent and Spencer, and which, with the surveys of the anchorages of Ports Adelaide and Glenelg, makes up an amount of coast-line equal to about 160 miles.

Queensland.—Mr. Bedwell and his assistant have completed an entire re-survey of Moreton Bay, which was much required; and they have likewise completed the outer coast from Cape Moreton to Point Danger,—thus connecting the shores of the two colonies of Queensland and New South Wales.

Red Sea.—Consequent on the Abyssinian expedition, additions have been made to our knowledge of the coasts and reefs of the Red Sea between Aden and Annesley Bay; for, although no specially fitted surveying-vessel was available for this service, it has been ably performed by Captain D. Bradshaw, of H.M.S. *Star*, who was selected for the duty from his special qualifications.

The results of the labours of the Hydrographical Department during the past year have consisted in the engraving and publication of 56 new charts, and the revision of a vast number of original ones, and about 164,000 have been printed for the use of the naval service and the public.

Sailing Directions for the west coast of Scotland, coasts of France, Spain, and Portugal, 2 volumes of the 'China Sea Directory, Newfoundland, Labrador, the North Sea, and Australia,' have been published, as well as the Annual Tables of Tides, Lights, &c.

NEW PUBLICATIONS.—The *Society's* '*Journal*,' vol. 37.—I have again to congratulate the Society on the punctual issue of the annual volume of our 'Journal' before the period of the anniversary, an admirable improvement on all antecedent practice, which is due exclusively to the zealous and untiring labours of our able Assistant-Secretary, Mr. H. W. Bates. The principal subjects contained in the present volume are:—Mr. Johnson's 'Report of his adventurous Journey across the Himalaya and the Kuen-lun to Khotan;' Dr. Mann 'On the Physical Geography and Climate of Natal,'—a truly

philosophical treatise on the subject, and founded on original observations; Colonel Tremenheere 'On the Physical Geography of the Lower Indus;' Professor Raimondi 'On a Portion of the Province of Carabaya in Southern Peru,'—an important contribution to the geography of this interesting region; Admiral Boutakoff's Memoir 'On the Delta and Mouths of the Amu Daria;' Lieutenant Bewsher 'On the Results of his Survey of a Portion of Mesopotamia, South and West of Baghdad;' Mr. Findlay 'On the last Journey of Dr. Livingstone,'—an able exposition of the geography of Central Africa, according to our present information, tending to show that Lake Tanganyika may be the ultimate source of the Nile; 'Notes on Eastern Persia and Western Beluchistan,' by Colonel Goldsmid; Kennedy's 'Report on an Expedition into Laos and Cambodia in 1866;' Dr. Haast's 'Altitude Sections across the New Zealand Alps of Canterbury Province;' and, lastly, Captain Godwin-Austen 'On the Pangong Lake District of Ladakh.' With the exception of the last-named, all these memoirs are accompanied by maps, mostly founded on original material supplied by the respective authors. On the geographical value of these memoirs it is needless for me further to dilate, especially as most of them have been read and discussed at our evening meetings, copious reports of which are published in our 'Proceedings;' but I may point out the large proportion which papers on physical geography, in this as in previous volumes, bear to those of mere description, as showing the importance we attach to the purely scientific aspects of our pursuit.

With regard to the numerous works published in various countries on subjects relating to geography, it is not my purpose, as I have stated in previous years, to pass them all in review in my annual addresses. According to established custom, I limit myself to a short notice of such as have fallen under my attention. Those who desire full information on current geographical literature will do well to consult that indispensible periodical, Petermann's 'Geographische Mittheilungen,' in which, from time to time, an article appears enumerating every work which has any bearing on geography, and arranged in classified order, according to countries.

Major's Life of Prince Henry.—I had occasion in my last year's Address to draw the attention of the Society to a remarkable work elucidating the comparative geography of Asia, by our associate Colonel Henry Yule, entitled, 'Cathay, and the Way Thither,' by which our acquaintance with the amount of knowledge of Eastern geography

possessed by our ancestors was vastly increased. I have this year to speak of another work of a similar character, which has recently been produced by our secretary, Mr. R. H. Major, in which a large number of entirely new points in the history of geographical discovery have been successfully established. It is impossible to open this book, which bears the title of 'The Life of Prince Henry of Portugal, surnamed the Navigator, and its Results,' without observing how great an amount of labour and patient research has been devoted to its preparation. Till comparatively recently the materials for such a work were not to be found in England; but, by the careful study of authentic contemporary documents, Mr. Major has brought into prominent relief the name and life of one till now too little known, but to whom, in fact, was due the discovery, within one century, of half the world. And it is in this aspect that this work has so much interest for our Society, since Prince Henry himself was the centre and source of all that activity in geographical discovery which made that period so remarkable.

Commencing with a description of the state of geographical knowledge in Prince Henry's time, and of the vague notions which prevailed respecting those unexplored regions which were bathed by the waters of the Sea of Darkness, Mr. Major leads us on through years of costly failure to the story of those wonderful discoveries which were made under the auspices of Prince Henry himself. In this portion of the work alone we are presented with an abundance of new material in the history of geography. The discovery of the Coast of Africa, from Cape Bojador to Sierra Leone, is given from the contemporary accounts of Azurara, Cadamosto, and Diogo Gomez; the first and last of which authors were previously unknown to English literature. Another original feature in the work is the circumstantial and conclusive refutation of a variety of claims set up on behalf of Genoese, Catalans, and Frenchmen, to priority in discovery of the Coast of Guinea. With respect to the important groups of islands in the Atlantic, we now for the first time learn that the Azores and Madeira group were discovered so early as the beginning of the fifteenth century by Genoese navigators in the service of Portugal, while for the Cape Verde Islands we are supplied with the name of an entirely new original discoverer, Diogo Gomez, in lieu of his supplanter, the Genoese Antonio de Nolli. The romantic story of the later accidental discovery of Madeira by the Englishman, Machin, which led to the exploration and colonisation of the island by Prince Henry's navigators, has now been definitely cleared from doubt, while the

complete history of the colonisation of the Azores is for the first time given in English. Still these are but incidents in comparison with the great 'Results' of the life of Prince Henry, which it is the real purpose of this comprehensive work to set forth. Within the small compass of a single century from the rounding of Cape Bojador, in 1434, we find more than one-half of the world opened up to man's knowledge by an unbroken chain of discovery, which originated in the genius and the efforts of this one man, whose name is all but unknown. The coasts of Africa visited—the Cape of Good Hope rounded—the New World disclosed—the seaway to India, the Moluccas and China laid open, the globe circumnavigated—and last, not least (for here I would take occasion to say that Mr. Major has made this subject peculiarly his own), Australia discovered. "Such were the stupendous results," to use Mr. Major's words, "of a great thought and of indomitable perseverance, in spite of twelve years of costly failure and disheartening ridicule. Had that failure and that ridicule produced on Prince Henry the effect which they ordinarily produce on other men, it is impossible to say what delays would have occurred before these mighty events would have been realised; for it must be borne in mind that the ardour not only of his own sailors, but of surrounding nations, owed its impulse to this pertinacity of purpose in him."

Keith Johnston's New Atlases.—Among the useful and important cartographical publications brought out by our Associate Mr. A. Keith Johnston, I have to mention the 'Handy Royal Atlas,' published this year, as a reliable work, giving the most recent discoveries by our travellers in Central Africa and Asia, and, for its size and form, easy to be consulted. I have also to notice with especial satisfaction the forthcoming issue by Mr. Johnston of a series of Elementary Atlases of General, Physical, Historical, and Scriptural Geography, which, being sold at extremely low prices, will, it is hoped, diffuse very widely much useful knowledge. The same indefatigable author is also about to issue during the summer a complete series of Geographical Text-books, arranged on a new plan, and in a style calculated to attract students, at the cost of a few pence each. Each map will have an accompanying handbook, so that the attention of the pupil or student will be limited to one subject at a time. These cheap and good scientific publications coming out now, when the better instruction of the people is so much advocated, cannot fail to be highly serviceable in popularising the study of Geography.

Chapman's Travels in South Africa.—Among recent publications, the narrative of Mr. James Chapman's Travels in South Africa, during a period of fifteen years, merits a commendatory notice on the part of geographers and naturalists. The ground he travelled over lies between Natal on the south, and the Zambesi River on the north, and from the Limpopo on the east, to Walvisch Bay on the west. Few persons occupied in trade as Mr. Chapman was could have given us such good sketches of the outlines of the country, and so many interesting details respecting the geology and botany of the wild regions he traversed. European readers may well be astonished to learn from Mr. Chapman, among the wonders of natural history which he witnessed, that in one district he walked 7 inches deep in a body of locusts, which devoured a cornfield in two hours. Many persons must doubtless be interested in the valuable contributions in various branches of natural history, whilst some of the sketches of the gorgeous scenes at and around the great Falls of the Zambesi, as executed by Mr. Baines, are telling adjuncts. I am pleased to see that the book has been well spoken of by able reviewers, one of whom, after recommending it to all who are interested in Africa, thus writes:—"As a traveller he has been adventurous and energetic, as a narrator truthful and modest; and it must not be forgotten that to such men as Mr. Chapman the gratitude of mankind is due." *

Millingen's Observations in Armenia and Kurdistan.—A work has recently appeared in Paris, and in the French language, which from its title would be supposed to be simply of historical and political interest, but which, in reality, contains a considerable amount of geographical information concerning parts of the Turkish empire of which very little is known. The work is entitled 'La Turquie sous la Règne d'Abdul-Aziz,' and contains the experiences of the author, Mr. Frederick Millingen, during three years' military service in the eastern part of Armenia, or northern Kurdistan. The numerous details gleaned by this intelligent observer concerning the tribes of Kurds in that region will prove interesting to the ethnologist; and the map attached to the volume, in which the tract of country lying between the south-eastern shores of Lake Van and the Persian frontier is delineated, recommend the work to the notice of geographers. The chief utility of the map is, that the districts peopled by the different Kurdish

* 'Spectator,' April 11, 1868, p. 444.

tribes, together with the names of their numerous villages, are laid down from the personal observations of the author.

Cornelissen's Treatise on the Temperature of the Sea off the Cape of Good Hope.—One of those memoirs on oceanic hydrography which are so important and valuable for the bearing they have on practical seamanship, as well as on the generalizations of physical geography, has recently appeared in the publications of the Royal Meteorological Institute of the Netherlands, from the pen of Captain J. E. Cornelissen, of the Dutch Navy. The conclusions arrived at by the author—after tabulating the results of nearly thirty thousand observations of the temperature of the sea, systematically made by Dutch shipmasters—are, that the warm Mozambique current spreads out towards the south of the Cape, and that the cold South polar current drives it towards the coast of Africa, the two alternately encroaching on each other's domain; and that the various positions, during the year, of these oceanic streams are explicable only by the existence of a submarine reef or bank, between 26° and 27° E. longitude and between 37° and 38° S. latitude, having a gentle slope to the south, and a steep inclination on the north and north-eastern side. Similar observations have been made by English observers; and, indeed, the memoir of Captain Cornelissen should be studied in connexion with the important paper read before our own Society by Mr. Henry Toynbee, and published in the thirty-fifth volume of our Journal; the merit of the Dutch memoir consisting in the co-ordination of a vast number of observations, made in all seasons, and recorded in the logs deposited by the intelligent seamen of that nation in the nautical department of the Dutch Government.

Jordan's Vis Inertiæ in the Ocean.—Mr. Wm. Leighton Jordan, our Associate, has recently published a treatise on the action of vis inertiæ in the ocean, a sequel to two former volumes on the elements as affected by the motions of the earth. In this work Mr. Jordan advances a series of propositions, carefully arranged, and based on the assumption that the waters of the ocean are acted on by the axial and orbital motion of the earth in a different degree to the solid matter of the globe; and, by his deductions, he accounts for most of the well ascertained currents of the ocean, and also infers that others yet undetected exist, by which the known circulation of the entire mass of waters is maintained. It is a subject of great difficulty, and one on which we are entirely deficient in data whereon to form a theory based on facts.

EUROPE.—*Spain.*—I am indebted to Don Francisco Coello, our able Honorary Corresponding Member at Madrid, for interesting details regarding the official surveys and the issue of Government maps in Spain, during the last year. In his communication he laments, as all men of science must do, the partial suspension of the great cadastral survey of the country, of which he was the director, and which employed a large staff of scientific men in working out, on a magnificent scale, the topography, hydrology, and geology of this imperfectly known part of Europe. Even the results of the preliminary surveys of the basins of the Douro, the Tagus, and the Guadiana, although finished in the same form as the Memoirs on the Ebro * and Guadalquivir, which had previously attracted so much attention, have been suffered to remain unpublished. The only portion of this national work which lingers on is the survey by small parties of limited districts previously commenced, and the neighbourhoods of large towns. Since the suspension of geodetical operations, Don Francisco Coello informs me that the definitive calculations have been completed on the meridian and parallel of Madrid, and in other directions; and that the lines were being connected with the Portuguese triangulation on the one hand, and the French—at Biarritz—on the other. A line of levels had also been commenced, with a view to the accurate determination of the altitude of Madrid above the sea-level, which is still a matter of dispute, and, although this work has been stopped like the rest of the survey, many important points in the mountain-chains of the Peninsula have been accurately measured. Thus it has been finally ascertained that the Peak of Mulhacen, in the Sierra Nevada, is the highest point in Spain, being 11,423 feet high, and exceeding the Pic de Nethou, the highest point in the Spanish portion of the Pyrenees, which is only 11,168 feet. The altitudes of many other mountains, exceeding 2000 mètres (6561 feet), under the meridian and parallel of Madrid, have been also determined with similar accuracy.

In conclusion, our Associate informs me that a number of new charts of the Philippine Islands have been issued by the Hydrographical Depôt of Madrid, and that the General Staff have published an Itinerary Map of Spain on a scale of $\frac{1}{500,000}$, in twenty sheets; copies of these maps are promised to our Society, and will be acceptable additions to our collection.

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* See Anniversary Address, 1866, 'Journal,' vol. xxxvi., p. clxv.

Switzerland.—According to a report communicated by our esteemed Correspondent, Mons. J. M. Ziegler, the exact measurement of levels in Switzerland determined on as a consequence of Swiss participation in the European Geodetical Congress, and entrusted to those able astronomers M. Hirsch of Neuchatel and M. Plantamour of Geneva, has made progress during the year 1867. By these operations all elevations, previously hypsometrically determined, will be reviewed throughout Switzerland. So far the work performed by Swiss surveyors has contrasted favourably with that done in connexion with it by surrounding States, and has been complimented by the astronomer Hansen of Gotha, President of the Central Board. Probably as a consequence of the grandeur and interest of its natural phenomena, in few countries is the study of physical geography more cultivated than in Switzerland. As evidence of this, may be cited the number of maps and treatises which annually appear, relating to the different phases of this fruitful department of science. I am informed by M. Ziegler that, since the completion of the Federal Survey, the measurement of the Swiss glaciers was determined on; and that the first series of the results (the work of M. Kindig) has been published, comprising the glaciers of South-Western Valais. In connexion with this subject, and the conditions which influence the climate of their country, the Swiss Natural Science Society have offered a prize to encourage investigations concerning the warm southerly wind or *Föhn*. The same Society has a Meteorological Section, and it must be allowed that Switzerland offers many questions of interest to stimulate their inquiries.

ARCTIC RESEARCHES.—Having participated during many years in the efforts made by our Society to encourage Arctic exploration, it has been my pleasing duty, handed down to me by my eminent predecessor Sir John Barrow, to welcome and encourage every proposal which has been brought before us, tending to add lustre to the fame that the British nation has achieved in the delineation of the geography of a region which we have almost made our own.

For a number of years the hope was entertained that a passage between the Atlantic and Pacific Oceans, useful in commerce, might be realised; but, though the honour of effecting a transit by sea and ice was first accomplished by Franklin, who sealed his success with his life, and shortly after by McClure, and though many of their brave associates, from the days of Parry to those of McClintock,

have explored and laid down the forms of large islands constituting a large archipelago in these frozen climes, all hope of ever establishing a practicable sea-passage has vanished. For, by our researches we now know that, in any latitudes which we have searched, the Arctic Sea is beset with islands, and the intensity of the cold thereby so much increased, that the narrow passages between them are necessarily frozen, and impassable to ships.

Of late years, however, our interest has been awakened to the accomplishment of another great Arctic desideratum, or that of reaching the North Pole itself. As British geographers, we naturally supported this project, in the consideration that the nation which had already added so much to our knowledge of these regions should crown the work, by determining whether an open sea or land existed at the Pole itself. The project was warmly supported by zoologists, botanists, meteorologists, and physicists; and, fortified by the support of the British Association for the Advancement of Science, this Society urged the Government to employ a small portion of our great maritime force in settling this important question. If the most stirring eloquence could have prevailed, the Memoir of that distinguished Arctic explorer Sherard Osborn, read to us in 1865, should have induced any Board of Admiralty to countenance the effort we called for. But our rulers paused, chiefly because we, the Geographers, had not made up our minds as to whether the British efforts should be made by the way of Baffin's Bay and Smith Sound, or by Spitzbergen; our associates being divided in opinion. And even in regard to the Spitzbergen route, some believed that the expedition ought to proceed between that island and Nova Zembla, and others preferred coasting along the east and north shores of Greenland. Hence the refusal of the Admiralty to sanction any expedition in 1865, though Osborn had clearly pointed out the small amount of exploration, comparatively speaking, which remained to be accomplished in solving the desired problem.

Recently the subject—which, though dormant, has never been abandoned by us—has been revived with vigour in Germany, entirely through the energy and skill of our Medallist Dr. Petermann, who, warmly advocating the voyage by Spitzbergen, has at his own risk fitted out a Norwegian yacht of 80 tons, the *Germania*, commanded by Karl Koldewey, which sailed probably to-day from Bergen in Norway, and will proceed to lat. 74½° N., along the eastern coast of Greenland. The French, also, have been roused by the appeal of a zealous young naval officer, Lieutenant Lam-

bert, to fit out an expedition to enter the Arctic Seas by Behring Strait; and, finally, we have once more been stimulated by Sherard Osborn to go forward in the cause he has so much at heart. Whilst in his last communication he gave many strong and good reasons for preferring, as heretofore, the route by Smith Sound to any other line, he is, I know, above all desirous that we should lie no longer on our oars, but that, at the latest in the ensuing year, whichever route may be preferred, something should be done in reopening this fine school for the training of hardy and adventurous seamen.

In his last Memoir, Captain Sherard Osborn gives great credit to the views of Dr. Petermann, who has indeed justly entitled himself to our warmest acknowledgments for the sagacity and talent with which he long ago deduced the existence of those northern lands, and laid them down in his maps from the evidence of the Russian explorers, and recently again examined by way of Behring Strait. At the same time the results of the inquiries of the Swedish expedition at and around Spitzbergen are, as Osborn thinks, antagonistic to the success of any effort in that direction.

Whilst such are the preparations and hopes in European countries, a great amount of fresh knowledge has been obtained by our American kinsmen, who in their whaling-vessels have pushed their enterprise through Behring Strait, far beyond the land first sighted by Kellett, and beyond 73° N. lat. have coasted extensive high lands which lie off the coast of Siberia, from which they are, it is thought, separated by the sea first seen by Wrangell. These, indeed, are great advances since the days when Collinson (whose discoveries in another direction have never been surpassed) determined the outline of the whole northern coast of America, and Kellett first saw Herald Island.

One of these masters of American whalers—Captain Long—has communicated to the 'Pacific Commercial Advertiser of Honolulu,' a report which, in giving a lively sketch of the progress of Arctic discovery from the days of Hudson and Frobisher, has enunciated the opinion that, if ever a transit by water be made between the Eastern and Western Oceans, it will not be by lines hitherto tried, but by an enterprise directed from Behring Strait.

Looking to the fact that the Arctic Sea is bounded by North America, Greenland, Spitzbergen, Nova Zembla, and Siberia, and that it is the recipient of the enormous bodies of water poured into it by many large rivers, he infers that the surplus must be mainly

discharged either by Spitzbergen or by Smith Sound and Baffin's Bay. Now, all navigators who have endeavoured to get towards the Pole by these lines have, he says, always met with a powerful outflow of water transporting and moving out the ice southward into the Atlantic. Thus it was that Parry, having proceeded with great perseverance in sledges 292 miles northwards, and having reached lat. 82° 45′, was only 172 miles from his starting-point, so steadily had the broken ice been carrying him and his party southwards by this great channel. Considering that the same outflow of water and ice has been met with by all explorers to the north of Smith Sound, Captain Long maintains that Behring Strait stands in favourable contrast to the other openings into the region of the Polar Sea, and is the channel in which the effort should be made. He affirms, from experience of whalers since 1847, that no great body of water finds its way south through Behring Strait; and that, at least in the spring and summer, the current is always found setting to the north, owing, as he infers, to the discharge of the rivers on the North American shore and that of the Anadyr on the Asiatic coast. He suggests, therefore, that a strong vessel of from 200 to 300 tons' burthen, and provided with sufficient steam-power to get through temporary obstacles, should follow the Asiatic shore from Behring Strait as far as Cape Kekurnai or Cape Schelagskoi. From some point between those capes the course would be to the north of the Laachoo Islands, whence the course towards Spitzbergen or the Pole would be influenced by the currents proceeding from the great Siberian rivers. If the vessel were obstructed by ice to the north of these islands, the outflow current, though not so strong as immediately to the north of Spitzbergen or in Baffin's Bay, would, he thinks, eventually carry the ship through one of the channels into the Atlantic.

Another route by which the voyage might, in the opinion of Captain Long, be accomplished, is to proceed from Behring Strait to the mouth of the Lena, then directly north beyond Cape Sievero Vostoschni, and then westwards towards Spitzbergen.

The letter of this experienced whaling captain is highly entitled to the notice of all persons interested in Arctic exploration, inasmuch as he assigns strong grounds for believing that hitherto we have been toiling like Sisyphus against natural obstacles; he believes that notwithstanding a few minor difficulties on the Siberian coast, if we once get a stout but small vessel into the current caused by the Yenissei and other great Siberian streams, that she would,

if entangled in the pack, be unquestionably carried forward into the Atlantic.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in *a single season to a very high latitude, if not to the Pole itself*. He proposes to take the ice at about 72°, where there is a deep bight running towards Shannon Island, and thence he could follow the continent of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as 78°, being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is

said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

Before I dismiss the subject of Arctic researches I must state that I have recently been informed by Professor A. E. Nordenskiold, of Stockholm, that the Swedish Government are preparing to make, during the approaching summer, an attempt to advance into the Polar Sea beyond Spitzbergen. A powerful screw-steamer, expressly built for winter navigation, has been granted for the purpose, and is to be provisioned for twelve months. Already the Swedish Government have gained honour by their encouragement of successive expeditions to Spitzbergen for the measurement of an arc of the meridian, and the scientific exploration of the islands, in which Professor Nordenskiold took part; that success may attend the present enterprise must be the prayer of all Geographers.

BRITISH NORTH AMERICA.—In an able review of the Memoir read by Mr. Alfred Waddington, during the present session, "On the Physical Geography of British Columbia," Dr. Cheadle has recently given* us a very suggestive forecast of the probable future of our North American Colonies, if those on the Pacific, so rich in coal and gold, be not speedily connected with those east of the Rocky Mountains and with Canada. Coming from the fellow-traveller of Lord Milton, who three years ago called public attention to the important subject of a north-west passage by land, I am happy to see Dr. Cheadle coincides with me in assigning great praise to Mr. Waddington, for the perseverance and intelligence with which he has promoted, at great pecuniary sacrifice, the exploration of British Columbia during many years, and for having been the first to indicate the best line of route between the Leatherhead Pass of the Rocky Mountains (described by Dr. Rae, Lord Milton and Dr. Cheadle), and Bute Inlet on the Pacific. It is manifest that the

* 'Pall Mall Gazette,' April 15, 1868, p. 3.

present isolation of the Pacific colonies from the rich countries watered by the Saskatchewan and the Red River is greatly to be lamented, and it is evident that if British North America is to be preserved in its entirety, a strong imperial will must be exerted and considerable expenditure incurred in the construction of lines of communication between our widely-separated provinces, which otherwise will be absorbed one by one by our energetic neighbours of the United States, commencing with the most readily accessible, the Red River Settlement.

CENTRAL AMERICA.—*Isthmus of Darien.*—Our attention has been directed, during the present session, to the ever-recurring and important subject of new lines of transit and projects of ship-canals across the great American isthmus. At one of our evening meetings, our enterprising associate, Mr. John Collinson, gave us an interesting narrative of his preliminary survey (in which he was accompanied by Lieutenant S. P. Oliver) across the unknown eastern part of Nicaragua, undertaken with a view to the selection of a line for a railway across the country, to terminate at Pim's Bay on the Atlantic side, and Realejo on the Pacific. The highest point of the line surveyed was found to be only 748 feet above the level of the Atlantic, and 620 feet above that of Lake Nicaragua; and the country, except for a few miles near the lake, was covered with the dense and lofty virgin-forest, which is characteristic of the lower levels in Tropical America.

The most easterly part of the American isthmus—the Isthmus of Darien—is that which has always presented the greatest difficulties to the explorer. The terrible sufferings of the survey-parties sent out to explore the line of the Savannah River and Port Escoces, fourteen years ago, when several members of the expedition perished of hunger in the trackless forests, must still be fresh in the memory of many persons. Notwithstanding, however, the failure of all previous attempts to cross the isthmus, M. Lucien de Puydt, under the auspices of the French Government, has devoted himself during the last few years to the examination of this difficult country. In 1861 he explored the line of the River Lara and Chuqunaque, and penetrated as far as was possible by water towards the sources of the River Tuyra; and believing that he then saw the chain of the Andes in that direction broken up into isolated hills, with two passes between them, revisited the district from the eastern or Atlantic side in 1865, and succeeded in reaching one of these passes, which he declares to be not more than about 120 feet above the sea-

level. The district of M. de Puydt's later exploration is one of the least known of the Isthmus of Darien, lying along the course and near the sources of the Tanela River, which disembogues in the Gulf of Uraba. Although we may regret the insufficiency of the observations of altitudes taken by the traveller,—and he describes his exploration as only preliminary to a more perfect survey,—the Memoir communicated to us by M. de Puydt must be admitted to contain much information on the geography, ethnology, and productions of a region hitherto almost unknown.

Before quitting the subject of the Isthmus of Darien, I have to record that a most useful volume on the subject of interoceanic transit has been published by Admiral Davis, of the National Observatory, Washington, which contains an outline of nearly all the various projects for connecting the two oceans, copiously illustrated by maps.

SOUTH AMERICA.—Last year it was my pleasing duty to record the continuation of the important explorations of the Purus and its tributaries by our associate and medallist, Mr. Chandless, which added so much to our knowledge of South American geography. Although I have not, on the present occasion, to bring to your notice any fact of such striking interest as this, much has been done in the investigation of the other great rivers of the Amazons basin, chiefly through the Peruvians, who have lately made strenuous efforts to explore the rivers in their eastern territory, with the view to the opening of new lines of communication. The reports of Peruvian officers engaged in these fluvial explorations have been published in the official Gazettes of Lima; but have not, as far as I am aware, been translated into English, or made known to the scientific public in Europe.

The expedition up the Ucayali and Pachitea rivers, which I noticed in my last year's Address as having succeeded in proving the navigability of these tributaries of the Amazons to within 325 miles of Lima, has been followed by a survey of the land-route between the head of the navigation and the city of Huanuco, in the inhabited parts of Peru. A brief account of this survey has been sent to our Society by our Corresponding Member, Don M. Felipe Paz Soldan, accompanied by a tracing of the map of the route, which will be interesting to English geographers, delineating the unexplored country into which our travellers Smith and Lowe found it impossible to advance in 1834. The port which is to be the future

place of embarkation at the foot of the Andes, for the voyage to Europe *viâ* the Amazons, has been named "Puerto General Prado" after the President of Peru; and is situated at the junction of the River Mayro with the Palcazo, more than 3600 miles distant from the Atlantic. The survey was executed by a Hydrographic Commission, under the direction of Admiral Tucker, a North-American naval officer, now in the Peruvian service; and all the principal points on the line have been fixed by astronomical observation. Profile sections of the route accompany the map, and we are promised a narrative of the expedition as soon as it is ready.

Another important undertaking has been the exploration of the River Javari in 1866, by a joint Frontier Commission of Peruvians and Brazilians. In all maps this tributary of the Amazons is represented as running from south to north, and it had been fixed upon in the last century as the boundary line, in this direction, between the colonial territories of Spain and Portugal; but the result of the recent exploration has been to show that the general direction of the stream is for several hundred miles south-east to north-west, or nearly parallel to the Amazons, and that it has numerous abrupt windings. A report of the survey has been sent to us by Don Manuel R. Paz Soldan, nephew of our Lima correspondent, who was the Peruvian Commissioner; but a great part of the journals and observations, as well as the instruments, were lost in a murderous affray with the wild Indians of this dangerous region,—a hundred savages armed with bows and poisoned arrows having suddenly attacked the party in a narrow part of the stream, walled-in by high forests, and killed the Brazilian Commissioner, besides wounding five others, including Señor Paz Soldan himself. The expedition had thus to turn back, leaving their large vessel in the hands of the Indians, and escaping in a small boat. The author of the Report speaks of the wide extent of fertile country watered by the Javari and other rivers, still unknown, and likely long to remain so, on account of the ferocious nature of its inhabitants.

The River Morona, an affluent of the left bank of the Upper Amazons, near the limit of navigation, was explored last year by the steamer *Napo*, under the command of Captain M. A. Vargas. The country on both sides of this little-known stream is scantily peopled by Indians, who obtain gold, for barter with white traders, with the greatest facility, by washing the sand of the beaches in the rudest manner. Captain Vargas observed the method of working, and obtained samples of the gold, which is of fine quality, and he

concludes his interesting report by expressing the opinion that the valleys of several of these northern tributaries abound in gold, the search for which will soon attract a large population.

Our indefatigable associate Professor Raimondi continues without interruption his valuable explorations of the Andean valleys of Central Peru, and has recently examined the course of the River Pulperia, an affluent of the Apurimac,—a journey undertaken with a view to ascertaining how far up the latter river was navigable. His memoir on this subject, which we have already received, like the previous one published in the last volume of our 'Journal,' abounds in interesting observations not only of the topography, but also of the physical geography and botany of this previously unknown district.

In other parts of South America there is little to record, except that Captain Burton has recently returned to his Consulate at Santos, after a journey of seven months through the interior of Brazil, and down the River San Francisco. His report of the journey may be shortly expected, and, being from the pen of so experienced and able a traveller, it cannot but contain much that will be new and interesting.

AUSTRALIA.—The chief additions to our knowledge of Australian geography have been made, as in the previous year, by small expeditions from the outskirts of the populated districts, undertaken to discover new lands suitable for settlement. In this way we are gradually becoming acquainted with the interior portions of Queensland and Western Australia. Under the enlightened encouragement of Governor Hampton, in the latter colony, much useful knowledge of the country between Nickol Bay and the Tropic of Capricorn has been obtained by parties under the leadership of Mr. T. C. Sholl, who has established the identity of the Ashburton with the Curlew River, and discovered several new streams flowing towards Exmouth Gulf.

Discoveries of some importance have been made in 1867, in the northern territory belonging to the colony of South Australia. After the failure of the Adam Bay settlement, the enterprising Government of Adelaide despatched Captain Cadell in a steamer named the *Eagle*, to explore the coast between the mouth of the Adelaide River and the Gulf of Carpentaria, previously imperfectly surveyed by Flinders and afterwards by Stokes, with a view to the discovery of some better site for a settlement than Adam Bay. The

Eagle left Sydney on the 29th March, 1867, and on arriving at the Gulf of Carpentaria examined all the inlets, commencing from the west of the Queensland frontier. Proceeding northward along the western shores of the Gulf, Captain Cadell discovered, first, a moderate-sized river in lat. 14° 27′; afterwards, in lat. 12° 33′ and long. 136° 55′, another river flowing into a fine haven of some 50 square miles' area; and again, on the western side of the deep gulf in which lies Arnhem's Bay, the mouths of three large rivers disemboguing in a deep bay, 20 miles in length by 10 in breadth, in a part of the coast hitherto represented on charts as dry land. Two of these rivers had 5 fathoms of water on the bar. The new bay was named Buckingham Bay, in honour of the Duke of Buckingham, the present Secretary of State for the Colonies. Another fine river was discovered about 30 miles to the eastward of the Liverpool, by Mr. H. B. Bristow, the chief officer in command of a boat-party. He proceeded 60 miles up the stream, and found the depth all that distance 4 fathoms, at low water, the width being 200 yards; the entrance to the river is 2½ miles wide. Natives were numerous on the shores of the river; and indeed the whole coast, which is fringed with islands, was found to be thickly inhabited. As a result of this exploration, Captain Cadell gives the estuary of the Liverpool River as by far the best site for a settlement in this region.

Central Asia and Western China.—For some years I have, in my Anniversary Addresses, directed attention to the grand and impassable mountain region lying between the Central Asiatic countries occupied by the Russians and our great Empire of India. In confirmation of the views I have entertained, I now refer you to the able and sound views on this subject, which are contained in the article of the last number of the 'Edinburgh Review' headed "Western China." In Eastern Turkistan, and in the great province of Yunan, the authority of the Chinese has been swept away, and the insurgent Mahomedans have established independent governments. From Eastern Turkistan the insurrection has spread also over the provinces of Khansa and Shansi, and even in the Szechuen districts bordering on Thibet. So, in the expressive language of the writer, "we really have before us grounds to surmise that this remote part of the world may at present be the scene of a great Moslem revival." We learn from our Associate Colonel Yule, that, even in the 13th century, Marco Polo found in the chief

city of Yunan, the westernmost province of China, a mixed assemblage of idolaters, Saracens, and Nestorian Christians; and the recent rise and spread of the Mussulman element is graphically told by the author of the article in question. By this last revolution, indeed, all the overland trade between British Burmah and China has been stopped, and some time must elapse before any commercial intercourse can be safely established with the new rulers. The great interest of the article I refer to consists in the condensed description of the internecine conflicts between the former governors, the Chinese and the Mussulmen, who have expelled them, and subsequently of the frequent battles and disturbances of the latter among themselves, now that they are unquestioned masters of all Eastern Turkistan, including the cities of Yarkand, Kashgar, and Khotan.

The most important of the leaders of these Mussulmen is Yakoob Kooshbegee of Khotan, now the ruler of all Eastern Turkistan, with whom the adventurous explorer Johnson, of the Trigonometrical Survey of India, came into communication, as recorded in our 'Proceedings.'

Although as anxious as any one to gain fresh geographical know ledge, I dissent from the views of those of my contemporaries, who, overlooking all obstacles where British *prestige* and power are to be extended, have blamed Sir John Lawrence for having discountenanced such excursions. I must record it as my opinion that the Governor-General of India has acted most wisely in abstaining from intercourse with these bellicose and unsettled Free Lances beyond the British frontier, whether they lie in Affghanistan on the west, or at Khotan and Kashgar on the north. At the same time, as President of this Society, I shall rejoice if the recommendation of the Expedition Committee of our Council be adopted, and that the able young Indian officer, Lieut. Hayward, who has already penetrated in sporting excursions to the north of the Hindoo Kush, should proceed, as an unauthorized individual, to the regions north of that mountain range, and define the flanks of the Pamir steppe, thus clearing up some of the problems in the physical geography of Central Asia.

Having during some years endeavoured to lead my associates to believe that the invasion of our Indian empire by Russia was a mere chimera and a political bugbear, so when I see a few thousand Cossacks gradually establishing order in Western Turkistan, and gradually gaining ground eastwards from the Syr Daria, I rejoice

to find that many of my countrymen no longer look with apprehension to their advances, but rather hail them as establishing settled government where all was previously chaos. In a word, the able reviewer to whom I have alluded, and who was for some time an efficient public servant in India, has thus written in regard to the grand and impassable mountains which happily separate British India from Turkistan :—"As for the security of the British empire, even the wildest of the Russophobists has not yet conceived the possibility of an invasion by the way of Karakorum." And when we consider that the Russian forces, which have now extended along the Syr Daria to Tashkend, do not exceed eight or ten thousand men in the remote provinces they have brought into order, and that they are separated from their great centre of supply by many wild and sterile countries, I trust we may hear no more of this phantom.

BRITISH BURMAH.*—I may now profitably call your attention to a region which has received less of the attention of geographers than it deserves, as will be at once seen in the following short statement which I obtained, a few days before his death, from my friend Mr. John Crawfurd, who was personally well acquainted with a large portion of the country. This is that part of our vast Indian dominion which in official language is called British Burmah, and on which admirable periodical reports have been made by the able men who have administered the government of this new country since the more important part of it came into our possession. These men are Sir Arthur Phayre, for many years the Chief Commissioner there, and at present his worthy successor Colonel A. Fytche. What has been accomplished in a few short years will appear from the following account of the present state of the province :—

The territory is composed of the ancient divisions of Pegu in the centre, Arracan to the north, and Tenasserim to the south, and is wholly tropical, extending from about the eleventh to the twenty-first degree of latitude, and has a computed area of 90,000 square miles, which make it some 6000 square miles larger than Great Britain. The eastern shore of the Bay of Bengal, over a vast line of 900 miles, forms its western boundary ; and along this line there are, in contrast to the absence of harbours which characterises the

* This portion of my Address, the work of my deeply lamented friend John Crawfurd, is the last of the many proofs I had of his willing co-operation.

western shore of the same bay, four good ones, being the embouchures of as many rivers; one of which, the Irrawady, is navigable by steamers for 500 miles.

We have in British Burmah a country in almost all respects widely differing from India, inhabited by a distinct race of men, differing from Hindus in language, in religion, and in manners. India is a thickly-peopled, and in many places even an over-peopled one, while Burmah is everywhere under-peopled. There is no room in India for that immigration which our territory in Trans-Gangetic India loudly invites. In 1861-2, the population of British Burmah was 1,897,807, and in 1866-7, or in five years' time, it had increased to 2,330,453, or 23 per cent., arising for the most part from emigration from the misgoverned native provinces bordering on it. The great majority of the inhabitants are natives of the country, but we have in this population also about 100,000 Hindu and Mahomedan settlers from India, and above 10,000 settlers from China. In the last year of the Return, the numbers of immigrants amounted to no fewer than 76,869. The ratio of population to land in British Hindustan ranges from 150 to 500 to every square mile; whereas, in our Trans-Gangetic province, it is little more than 25, or one-sixth of the lowest, and one-twentieth of the highest, density of India. As a resource for emigration, then, Burmah is to India what America and Australia are to England.

The two staple products of British Burmah point at the nature and quality of the country. They are rice and teak timber; the first the main cereal everywhere of the tropics, and the last the only timber that equals, if it does not indeed excel, British oak. The export of rice, in 1865-6, amounted to 6,089,700 cwt., of the local value of 1,825,209*l.* Of this corn, British Burmah is the largest exporting country in the world—an advantage which it owes to the abundance and suitableness of its land, and the favourable nature of its climate, and more especially to the 10,000 square miles of alluvial soil which constitute the deltas of its great rivers. Before the British accession all export of rice was forbidden.

The teak forests of British Burmah are by far the largest in India, but the supplies which we obtain from the foreign states of Burmah, Siam, and other countries, and which pass through our territory for a market, are still larger than our own. In 1865-6, 14,000 logs of teak were imported from foreign countries, and 24,178 loads, of the value of 144,540*l.*, were exported chiefly to form the backing of English "iron shields."

Mr. Crawfurd added to his instructive commentary on British Burmah some valuable, and it seems to me well-founded, objections to the attempt to establish a railroad between Rangoon and the western Chinese province of Yunan. He showed that this province, the poorest of the empire, is almost entirely inhabited by Mahomedans who are now in insurrection; and besides this there lies a vast country between British Burmah and the Chinese frontier, which is occupied by wild, lawless, and independent tribes. Hence it is that at the present day the raw silk from China, which formerly was brought overland, now comes to Rangoon much better and cheaper after it has gone over the China Sea, through the Straits of Malacca, and up the Bay of Bengal—a voyage of some 3000 miles.

If, however, the project of a railroad from Rangoon to China is not to be thought of, the local authorities of British Burmah, supported by the commercial community, have submitted to the Supreme Government of India the project of a guaranteed railroad, which, from its national, practical, and moderate character, is well entitled to favourable consideration. It is to be wholly within British territory, and to run over the most fertile and populous portion of the province, comprising a distance of 180 miles; one terminus being the port of Rangoon, a town of 70,000 inhabitants, and the other Prome, near our northern frontier, a town with a population of 22,000.

Thibet and Lhasa.—We have received during the past year, through the enterprising but well-considered arrangements of Captain Montgomerie, who is now in executive charge of the Great Trigonometrical Survey of India, a most valuable accession to our knowledge of the geography of the Trans-Himalayan regions. This officer, finding it impossible to employ his English assistants, either with safety or advantage, beyond the dominions of our ally the Maharaja of Cashmire, proposed to educate intelligent natives for the purpose of extending exploration to the northward, and thus enlarging the scope of his survey. His proposal met with the approval of the Government; and, if we may judge from the success of the two first experiments that have been made, it is likely to lead to the most important results.

At our last Anniversary it was announced to the Society that one of Captain Montgomerie's native assistants, a Mahometan who had acquired a competent knowledge of the use of scientific instruments, had penetrated from the Karakorum Pass to Yarkand, determining for the first time the true astronomical position of that town, and

connecting it through a well-executed route-survey with our trigonometrical operations in Thibet. I have now to notice a still more important achievement, for which we are indebted to Captain Montgomerie's judicious encouragement of native talent, and which has attracted much attention both in India and England. The extensive plateau beyond the crests of the Himalaya, which stretches west and east from Mount Kailas and the Mansarowar Lake to Lhasa in Great Thibet, has never been visited by Moslem travellers; and although, a century and a half ago, a Catholic missionary of the name of Hippolito Desideri did traverse the entire distance in his journey from Cashmire, *viâ* Ladak to Lhasa, he has left no information of any value with regard to the geography of the country. The interval, therefore, upon this line between the Mansarowar Lake and the great monastery of Teshú-Lúmbú near Lhasa, which was visited by Warren Hastings's envoys—Mr. Bogle and Major Turner—was regarded as a sort of *terra incognita;* and was thus judged by Captain Montgomerie to be particularly deserving of his attention. He employed accordingly two brothers, intelligent young Brahmins, who had been fully instructed in the use of surveying instruments, to explore this region. They proceeded from India by way of Nepaul, and, after numerous failures, one of the two succeeded in eluding the vigilance of the Thibetan officials, and obtaining access to the country. With marvellous address and no little boldness and energy, this individual —now generally known as Captain Montgomerie's Pundit—penetrated from the Nepaul frontier to the city of Lhasa, and subsequently returned from that city along the banks of the Brahmaputra to the source of that river in the Mansarowar Lake; from whence he crossed the Himalayas to the plains of India, leaving his brother, whom he had rejoined on the Indian frontier, to continue the survey from the lake to Ladak.

Throughout this long tract, a distance of over 800 miles, we are now, therefore, in possession of a continuous route-survey, verified by astronomical observations, at a number of intermediate points, and rendered still more valuable by reliable information regarding the climatology and physical geography of this hitherto almost unknown region. That the Pundit, while maintaining his disguise, should have been able, amid a watchful and suspicious people, to keep upon so long a line a careful road-book with a full record of bearings and distances, and a very extensive register of observations, is certainly no ordinary feat; and reflects infinite credit, not only on the individual employed, but on Captain Montgomerie's judgment in selecting

him for the duty. The Society will further be glad to learn that the Council have awarded a Gold Watch of the value of 30*l.* to the Pundit, in commemoration of his courage, ability, and address, and to mark their sense of the value of the services which he has rendered to Geography.

COAL AND GOLD OF SOUTH-EASTERN AFRICA.—The colony of Natal seems to be destined to rise into considerable importance, if the coal, which is there plentiful, particularly in its north-western parts, should be rendered useful by the construction of railroads to convey it from the interior to the towns of Pieter Maritzburg and Durban. I have reason to think that this coal was formed in Palæozoic times, and is of the best quality. In order to determine its extent and by what means it can be best worked and transported, I have, on being consulted, recommended Her Majesty's Government to send out a competent mining engineer to report upon the most efficient steps to be taken in order to work out this important problem; for, independently of the establishment of local manufactories which the possession of coal would bring about, the capability of supplying our steam-vessels and packets with fuel upon the east coast of Africa would be a notable advantage. I have been much interested in tracing the various positions occupied by this coal upon the map of Natal, prepared by the colonial surveyor, Dr. Sutherland, as well as on a large map drawn out by our associate Dr. Mann, who so well represents the interests of this colony in Europe.

The existence of another source of wealth in an adjacent region on the north-west, commonly known as the country of Mosilikatse, has recently thrown the colonists of Natal into a state of great excitement. In that part of the interior, to the north-west of the Transvaal Territory, hitherto chiefly noted for its ivory and ostrich feathers, gold has been discovered in considerable quantity.

Mr. Carl Mauch, to whom we are indebted for the realization of this fact, and, of whom we first heard through the newspapers of Natal and the Cape of Good Hope, has really proved himself to be an explorer of considerable merit, both as a geographer and a geologist. Having been in frequent communication with our Medallist Dr. Petermann, I gather these data from a forthcoming number of the 'Mittheilungen,' to which I have had access:—Leaving Trieste in 1863, he has been travelling in South Africa since 1865. Having traversed and examined the Transvaal Territory, of which

he constructed a map, he became acquainted with Mr. Hartley an elephant-hunter, who, in quest of ivory, had visited all the highest lands of the region which forms the broad-backed lofty watershed between the rivers Zambesi, on the north, and Limpopo on the south. Being informed by Hartley of the existence in these high and rocky lands of the relics of ancient metalliferous excavations, Mr. Carl Mauch explored them, hammer in hand, and in two separate localities *—the one in s. lat. 20° 40′, and on an affluent of the Limpopo, the other on an affluent of the Zambesi, about 40 miles south of Tete—he discovered rich auriferous white quartz-rocks, embayed in a variety of ancient crystalline rocks, whether hard slates (probably Silurian) or various igneous rocks, including a great predominance of granite and diorite. The loftiest part of this elevated tract being 7000 feet above the sea, and lying in s. lat. 19° 50′ and E. long. 28° 35′, presents in parts great accumulations of these broken masses of granite, to which my illustrious friend the late Leopold von Buch assigned the appropriate name of "Felsen Meer," or a sea of rocks. Many travellers have too often erroneously considered these to be boulders, whilst in fact they are simply the results of decomposition *in situ*, as seen in many granitic countries.

The auriferous quartz-rock, which in places is still seen to rise a few feet above the surface, has, where rich in gold, been quarried down in open trenches to the depth of 6 feet or more. These works seem to have been abandoned simply from the influx of water, and in one spot the traveller detected the remains of smelting operations with slag and scoriæ, the relics of lead-ore being also observable.

Of the auriferous localities described by Mr. Mauch, that which lies to the north, on a tributary of the Zambesi, is the most sterile, and this fact explains why the Portuguese have never made much of it; Dr. Livingstone having only spoken of small quantities of gold-dust being washed down in the rivers to the south of Tete.

On the other hand, the existence of the rich tract on the river Thuti, or Tuti, an affluent of the Limpopo, and the proof of old works having been in operation there, greatly favours the suggestion I am about to offer that the Ophir of Solomon was probably near the mouth of that great stream. In the mean time the discoveries of Mr. Mauch have awakened the interest of many of the colonists of

* In the original map of Mr. Mauch, which Dr. Petermann has submitted to my inspection, a third and intermediate gold tract is laid down.

Natal, and doubtless the tract, which seems to have been neglected for so many centuries, will be soon the scene of active operations of the miner.*

As Mr. Mauch has visited the colony of Natal, where he was warmly received by our countrymen, and has had the opportunity of regulating his astronomical instruments by comparison with those of the Observatory of Pieter Maritzburg, I anticipate that he will largely and accurately extend our acquaintance with that great backbone of South Africa. I would add that, as the Council of our Society did, by small advances of money, assist Gerhard Rohlfs in carrying out those researches in Northern Africa which have obtained for him one of our Gold Medals, so I venture to hope that they will approve my suggestion that Mr. Carl Mauch—who, unassisted by any Government, has been accomplishing such great results on the slenderest means (provided by partial subscriptions raised in Germany)—may receive at our hands such aid as will enable him to bring his labours to a successful termination.

This newly-discovered auriferous tract is, I may state, precisely in that position in which, as a geologist, I should have expected to find gold, *i. e.* in the elevated and ancient slaty quartzose rocks (probably Silurian), with granite and greenstone, which form the mountains, in s. lat. 21°, that constitute the watershed whence some streams, tributaries of the Zambesi, flow to the north, and others, tributaries of the Limpopo, to the south. From the well-known fact that some of the rivers of Africa—particularly the Niger and its affluents—contain gold-dust, we may reasonably expect that the other mountain-tracts from which they flow will eventually prove to be as auriferous as the upper region of the Limpopo in the south-east of Africa; and thus with the spread of enterprise the geological *nuclei* or back-bones of Africa may prove remunerative to searchers for the precious metal.

This discovery of gold leads us once more to consider a suggestion made to us two years ago by Mr. George Thompson, namely, that the Ophir of Solomon might, after all, have been situated in the country of the Limpopo. He supported his view

* Whilst I write I have received a pamphlet, entitled 'The Gold-Fields of South Africa, and the Way to reach them;' in which the author, Mr. Robert Babbs, invites his countrymen and speculators to reach these gold-fields by way of Natal. I am indebted also to Mr. John Robinson, editor of the 'Natal Mercury,' for information regarding the gold discovery, which has naturally excited great expectations in that colony. In a recent letter, he states that a pioneer party, under the guidance of Mr. Hartley, left Potchefstroom for the gold-fields on the 13th March.

by mentioning recent reports brought by some missionaries of the existence on that stream of ruins of an ancient city. The discovery of gold will, I hope, lead to the opening out to us of a large portion of the interior hitherto traversed only by an occasional elephant-hunter. I trust, indeed, that the day is not distant when some adventurous explorer will make the boating-voyage from the interior by the Limpopo River to its mouth, as suggested by my friend Mr. W. Webb, and thus escape the necessity of a land-journey which no traveller with oxen can hope to accomplish, on account of the bites of the dreadful Tsetse fly, which infests that region. By such a boat-journey we should become acquainted with the whole course of this grand stream and its embouchure in the Indian Ocean, which has remained unknown to the present time.

The Ophir of Scripture had from early times been supposed to lie somewhere on the south-east coast of Africa.* It was this belief that led the Portuguese to send expeditions soon after the voyage of Vasco de Gama, and subsequently to colonise largely in these latitudes; the relics of churches built by the Jesuit fathers being, it is said, still to be traced. But, after all, the Portuguese were never successful in finding any great gold-field, owing probably to their chief settlements being upon the Zambesi and to their having omitted to extend their researches southwards in the interior.

The question as to the real site of the Ophir of Solomon has long been a subject of dispute. My lamented friend the late Mr. John Crawfurd, President of the Ethnological Society, has in his excellent work, 'The Descriptive Dictionary of the Indian Islands,' analysed with great perspicuity and much knowledge the various hypotheses which have been suggested, and has considered that Ophir cannot with any show of possibility be placed in any part of India where the great geographer Carl Ritter had supposed it to be. Quite agreeing with my eminent friend that all the commodities forming the exports from Ophir could not well have been the native products of one and the same place, and that Ophir may have been an emporium, we have yet to ascertain, by a proper survey, whether the site of such an important place of trade might not have been at or near the mouth of the great Limpopo River which flows from the above-

* See D'Anville's Disquisition on Ophir, 'Mem. de l'Acad. des Sciences,' t. xxx. p. 83.

mentioned gold mountains. Looking to the great objection to the hypothesis of Ophir being in India, inasmuch as the seamen of the days of Solomon could not have made such long voyages, the learned author of the article "Ophir," in Smith's 'Dictionary of the Bible,' naturally preferred Arabia as the country in which Ophir was situated, both from its proximity to the Holy Land and as being within the bounds of the earliest navigators. Although I at one time thought that Arabia might possibly have been the auriferous region in question, I abandoned that idea when I ascertained that the mineral structure of that peninsula was such as to render it most unlikely that at any time it could have yielded gold. The absence of rivers and seaports is also strongly against the Arabian hypothesis.

Knowing, as we now do, from the structure of the adjacent countries, that the traders from Tarshish, whether Tyrians or Jews, could find no gold on either shore of the Red Sea, they would naturally continue their coasting voyage along the east coast of Africa in their endeavour to find it. In doing so, we further know, both from the mineral structure of the region north of the equator and the fact that the Jub, Ozy, and other streams which traverse the Somauli country, flow from tracts of sandstone and volcanic rocks, and bring down no gold-dust, that the old navigators could meet with no success in those parallels. Neither is the country between Zanzibar and the Zambesi auriferous. It is only on reaching the latitude of 21° s. that auriferous rocks occur in the mountains of the interior, in a region from which, as before said, the waters flow to the Zambesi on the north, but chiefly to the Limpopo on the south.

I venture, therefore, to say, that of all the sites hitherto suggested, the region which feeds these streams was, according to our present knowledge, in all probability the source which supplied the ancient Ophir. I have before stated that this region, besides gold, is rich in ivory and ostrich feathers; and if Hebrew scholars see no objection to the supposition that the Biblical writers might not clearly distinguish between the feathers of the peacock and those of the ostrich, another difficulty in choosing this South African site of Ophir vanishes. I would also add that parts of this region are specially rich in ebony — so rich indeed that, according to Livingstone, great profit might be obtained by bringing home cargoes of those valuable trees from the River Rovuma. Now, may not these have been the famous almug-trees of which Solomon made

pillars for the House of the Lord and the King's House, as well as harps and psalteries for the singers?

Mr. Crawfurd has very successfully shown that "sandal-wood," as suggested by some writers, could not, from its diminutive size, have been the almug-tree; and knowing, as we now do, the comparatively great size of the ebony and its beauty and tenacity, I suggest that this is a good additional reason for the adoption of the site I have suggested. However this may be, I earnestly hope that ere long the Limpopo and its branches may be well examined, if only with a view of ascertaining the truth of the rumour that extensive ruins of ancient buildings lie near them.

ABYSSINIA.—At various periods since the foundation of this Society, our attention has been attracted to some part or other of this region, so diversified in physical features and so unlike other parts of the world in the character and condition of its inhabitants. At the opening of the present Session I congratulated you on having our interest in this remarkable country re-awakened by our able Secretary Mr. Clements Markham, who brought before us in a most telling manner the wonderful exploits of our precursors in bold adventure, the Portuguese, who carried out expeditions in that country during the fifteenth, sixteenth, and seventeenth centuries. I also reminded you that, a quarter of a century ago, when I presided over you, I put before you in a condensed form all the sources of information we then possessed with regard to the country; those comments being elicited by the then recent researches of our Associate Dr. Beke, which we rewarded with our highest honour, for having, more than any of the travellers who had visited Abyssinia in the preceding forty years, added to our geographical acquaintance with it. During and since that time there has, indeed, existed between our countrymen and the French, an honourable rivalry. Led on by the able and zealous brothers d'Abbadie, many of our opposite neighbours, including Combes and Tamissier, and many others, have distinguished themselves as Abyssinian explorers. One of our own Fellows, Mr. Mansfield Parkyns, has also been much distinguished by his labours in this wild field, and has led us to give entire credence to the narrative of the great traveller Bruce, which, when first told, was so much discredited. In my opening Address of the Session I also told you that Her Majesty's Government approved the suggestion which

I offered to them of employing a certain number of men of science as attendants upon the military expedition about to proceed; and you also know that, whilst the greater number of the gentlemen so employed accompanied the force from India, our Secretary Mr. Clements Markham went from England, as the Geographer of the Expedition.

Confined as the advance of the British army has been to the long and lofty mountain range which forms the eastern boundary of the Abyssinian plateau, geographers must still take much interest in that range in itself, seeing that it is the dominant and leading feature of the whole region, in being the "*divortia aquarum*" between the Nile and the Mediterranean on the one hand and the Red Sea and the Indian Ocean on the other.

Ever with the advanced guard, and stationed for some time at Senafé before the general forward movement took place, Mr. Markham has been enabled to make many good observations on latitudes and longitudes, the heights of the mountains and plateaus, and the character of the rocks. He has also given us, in two memoirs which have been read to the Society, striking descriptions of the meteorology and natural scenery, as well as of the changes of vegetation at each varying altitude, in these highly-diversified highlands. A third memoir has been received, and a fourth is promised when the description of the country up to Magdala shall have been completed, and in this he will describe his entrance into Magdala with the storming party, as I know by a letter he has written to me on his gallop homewards. Even on that eventful day the Geographer was at work, for he took two observations for latitude on the heights of Magdala.

I have no hesitation in saying that, when they are put together, these memoirs of Mr. Markham will form as creditable a portion of the 'Journal' of the Society as it has ever contained; and I therefore feel satisfied that I did well in strongly recommending him to the Secretary for India as one well qualified to be the Geographer of the Abyssinian Expedition.*

During the progress of this great enterprise, the various depart-

* Whilst these sheets are passing through the press, our meeting of the 8th of June has taken place, and the Fellows have heard from Mr. Markham himself—happily returned from his honourable and successful mission—the interesting account of the line of march from Antalo southwards, and the Topography of Magdala.

ments of the public service and public institutions have been well supplied with the best and most recent geographical information of this country by the Topographical Department of the War Office, which has issued at intervals successive editions of the route-map and other maps of Abyssinia. The chief credit of this is due to the promptitude and intelligence of Colonel A. C. Cooke, under whose direct superintendence the maps, as well as the publication entitled 'Routes in Abyssinia,' and many engravings of scenery, have been compiled.

Sympathising as I do with an eloquent writer in a recent number of an able periodical* in the astonishment he expresses at the apathy with which many of our countrymen regard this expedition, I ask with him, When has Europe marched a scientifically-organised army into an unknown intertropical region, and urged it forward as we have done, for hundreds of miles over chain after chain of Alps amid the grandest scenery? and all to punish a dark king, of whom we only know that he was an able but unscrupulous tyrant who insulted us by unjustly imprisoning our countrymen. This truly is a fine moral lesson which we have read to the world; and as, in addition, we reap good scientific data, the Abyssinian Expedition will be chronicled in the pages of history as more worthy of an admiring posterity than many a campaign in which greater political results have been obtained, after much bloodshed, but without the smallest addition to human knowledge. I may add the expression of my delight that the distinguished General who has accomplished these glorious results is a man of science, and is particularly well versed in Geography.

DEPENDENCE OF GEOGRAPHY ON GEOLOGY.—*The oldest Comparative Geography.*—Having now touched upon some of the chief advances made by Geographers during the past year, I may briefly direct your attention to those subterranean phenomena by which the present outlines of sea and land have been mainly determined, and ask you not to rest satisfied with merely exploring and describing distant and unknown countries, or in fixing latitudes and longitudes. I would incite you to increase the pleasure of your studies by endeavouring to trace, from ages long anterior to the creation of man, the various changes which the surface has undergone before the present contours of land and water were attained,

* 'Spectator,' April 18, 1868, p. 456.

and to ascertain by what natural agencies such outlines have been successively brought about. If it be said that this is entering into purely geological questions, my answer is, that, as a weather-beaten explorer of the rocks, it is my pleasing duty to revert to my old love, and to stimulate you to ponder on the grand series of pre-historic events by which the present relations of land and sea have been realised.

Possessing no distinct evidence to show us what were the earliest conditions of the planet, whilst (according to general belief) it was passing from a molten mass into a solid spheroid, and seeing that, at the beginning of the geological record, we are as much lost in obscurity as the astronomer who peers into the remotest nebulæ, the geologist explains to us, after fair search and inquiry, what were for the most part the aqueous, if not the hydrographical, conditions at the time when the oldest strata were deposited. He has so worked out the order in which the stony tablets forming the crust of the earth lie upon each other, containing within them the records of the earliest as well as of all succeeding living things, that he has at last developed the history of former life, from that beginning when only the lowest invertebrate creatures lived in the sea, and were buried in the first-formed marine sediments, through an ascending order of creations, until the human period was attained.

Leaving these records of successive creations to the palæontologist, the physical geographer may unite with the geologist in the endeavour to elucidate the changes of the surface, as due to each great perturbation which the crust of the earth has undergone. In short, the ups and downs of the geologist are the fundamental data on which our present geographical features mainly depend.

It has been ascertained that life was first breathed into the waters in the form of marine invertebrate creatures of the lowest class called Foraminifera. We have learned, indeed, that the mud and sediment of those earliest seas, in which only such animals (and probably seaweeds) lived, were subsequently transformed into those crystalline gneissic rocks which constitute the basement of the Laurentian system of North America and the fundamental gneiss of North Britain and Bohemia.

The succeeding period, as proved by fossil remains in the lower stages of the Silurian rocks, was one in which a variety of marine animals, *i.e.* of shell-fish, crustaceans, and mollusks, began to abound, though these invertebrates are wholly dissimilar in species from any known in the present era.

During all these long early periods we have scarcely any proofs of the existence of lands; and, though some terra firma must have existed to afford materials for the accumulations of the sea-beds, we have every reason to believe that there were then no lofty mountains. In other words, it is supposed that the seas then occupied enormously wide spaces, and also that a much more uniform temperature and climate prevailed in both hemispheres than at present, judging from the fact that the fossil remains found in these ancient strata have a common *facies*, though found in regions widely remote from each other.

For a very long time, then, we may infer that, in the absence of high lands, nothing approaching to the present physical outlines of the surface existed. As time rolled on, this ancient fauna was largely increased by the creation of many new marine animals; but during all the immensely long older Silurian era the seas were unoccupied by a single fish, or, in other words, by any animal having a vertebrate column or backbone. The first fishes suddenly appeared towards the close of the long Silurian epoch,* and, judging from the structure of the deposits, this particular period was one of long-continued quiescence. And yet this earliest kind of vertebrate animal, whose bones assure us that it is the prototype of the human skeleton, is distinct from and unconnected with all the other marine animals which lived before and with it. Thus, these first fishes are as clear a manifestation of creative power as any of those other proofs which are offered to us, as we mount up through the overlying formations, and continue our inquiry until we reach the recent superficial deposits.

It was at about the period when fishes appeared that we have the first proofs of the existence of dry lands, in the remnants of some curious land-plants; and then, indeed, it is clear that the earth's outline was becoming more diversified. But still we are without evidence that any great rivers then flowed from mountains. In the mean time, however, various outbursts of igneous rocks, whether porphyries, greenstones, basalts, &c., had been penetrating the surface, and had therefore added much to the materials out of which all marine deposits might be formed; doubtless these operations considerably changed the outline, and thus began the first approaches towards the present features of the earth, and the diversified relations of land and water.

* See 'Siluria,' 4th Edition, p. 477.

In subsequent ages fresh accumulations were added to the crust of the globe, and, in tracing these upwards, the geologist has demonstrated that he meets successively with races of higher organisation; so that, having passed through the successive additions of lizards and warm-blooded quadrupeds to all that pre-existed, he finds relics of the human race in the uppermost of all these accumulations, and lying above those of all other kinds of animals. During this incalculably long time the face of the globe underwent numberless changes, most of which were due either to contractions of the crust, or to the expansion of internal heat and gases, producing great folds, crumplings, downcasts, and breaks in the outer layers of the earth. In some regions the strata, raised from sea-bottoms into lands and hills, were by that action of internal heat folded over into a multitude of convolutions. Occasionally these folds were broken athwart, leaving the great solutions of their continuity which are called faults.

Now, whether by such convolutions, or by the more complex action of innumerable fractures, such deposits were affected, I maintain that they then had impressed upon them certain great outlines, which, much as they have been since modified by atmospheric and diurnal action, still constitute in many tracts the chief drainage lines of the several continents and islands which geographers have to examine. In estimating the various perturbations of terrestrial masses, whether by upheaval or depression, of which geology affords evidence from the earliest period up to historic days, my belief is, that to one or other of these movements we can in many cases trace the *origin* of those valleys, deep lakes, gorges, and river-courses, which it is the province of the geographer to describe.

In illustration of these views, I may say that there are many mountain tracts, such as the Central Highlands of Scotland, large parts of Scandinavia, and the Ural Mountains, in which there is clear evidence that rocks of very high antiquity occupied their relative positions, and had deep depressions across them, at the times when such main outlines were originally determined. I believe, that in many cases the watercourses which still flow in the valleys took their direction then, and have ever since continued to act; necessarily deepening their beds in the highly inclined or mountainous parts, whilst encumbering the lower countries with their *débris* and silt.

Hence I infer that there are regions in which these old and pris-

tine depressions have remained to this day as the prominent features which determined, and still maintain,* the main lines along which atmospheric action, snow, and ice, and water, would necessarily exert the greatest influence in eroding the rocks.

There are, however, many tracts, such as parts of England, wherein great masses of secondary and tertiary rocks have been successively accumulated, and have covered over the ancient rocks; and in such districts the aboriginal lines impressed upon the older rocks have been hidden. The Alps—particularly the Western Alps—afford illustrations of both these phenomena; for there we can see tracts where the old rocks exhibit the original features of elevation, fracture, depression, and convolution; whilst, in other parts, we note how such pristine features have been obscured by the subsequent accumulation of younger deposits. Again, we have in that chain the clearest proof that it underwent great upheavals by one of the very latest geological movements, at which time some of the youngest formations on its flanks were raised into the highest pinnacles of the chain, having often undergone such intense metamorphism that the latest of them have assumed the mineral aspect of the oldest rocks. Yet through all this chaotic assemblage the skilful geologist can often trace to one or other of the great movements which the masses have undergone the dominant causes which have led to the existing drainage of these mountains.

True it is that glaciers and melting snows have through long ages widened gorges and ravines, and have worn away large portions of the mountain sides, but they have not, in my opinion, really originated the great valleys in and along which the glaciers have advanced.

Looking at the surface of the globe in this aspect, the geologist is but the physical geographer of former periods, and he ascertains beyond all doubt that, when the tertiary periods were completed, and long anterior to the creation of man, the hills and valleys of all continents and islands had, to a very great extent, assumed their present outlines—such outlines having been mainly due to subterranean action, followed at intervals by powerful denudations.

Having laboured through many a year in the endeavour to establish certain well-known land, sea, and river marks, in geological

* This view has been ably sustained by the Duke of Argyll, as regards the Argyllshire highlands, in a masterly memoir, recently read before the Geological Society of London.

science, I have made these observations to incite all travellers never to neglect the observation of these ancient phenomena, upon which the basis of physical geography rests. By connecting them further with the various proofs of the eruption of those igneous rocks which form such a large portion of our subsoil, they will in all their excursions have an additional stimulus to look to the foundations of our science; and, if imbued with the love of nature, they may, like the illustrious Humboldt, combine such knowledge of the earth on which they tread with all the existing wonders of animal and vegetable life which characterize its various zones of altitude and climate.

LIVINGSTONE'S PROGRESS IN SOUTH AFRICA.—Glorious indeed have been the tidings which we have received since the last Anniversary, in relation to the great South African traveller. It was then my duty to recapitulate my reasons for the utter disbelief I entertained of the truth of the story of his death, so generally believed, and I added other indications to prove the falsehood of the Johanna men. I also dwelt with satisfaction and gratitude on the support which Her Majesty's Government had afforded to the Council and myself in sending out a boat expedition by the Zambesi and Shiré rivers to the Lake Nyassa, to ascertain the truth. Rejoiced indeed did I feel when that expedition returned precisely at the time calculated, bearing the joyful intelligence, that not only had Livingstone not been killed at or near to Lake Nyassa, but that, accompanied by his nine trusty negroes (six of them christianised lads from Nassick near Bombay), he had passed on for many days' march into the interior. My anticipations as to the falsehood of the Johanna men having been thus realised, I felt certain that, if his usually robust health continued, we should not be long without obtaining that intelligence from himself which has since come, and filled the country with gladness.

Few can realise the anxiety I felt until the gallant and skilful Mr. E. D. Young brought us the first happy news; for I well knew how many chances of failure hung in suspense over that expedition. The boat was constructed of thirty-eight pieces of elastic steel, which had to be put together and taken to pieces three times after it reached the mouth of the Zambesi; to be carried past the great rapids and falls of the Shiré for 40 miles on the backs of negroes; again broken up on returning, and again put together to

descend the Zambesi, where the party were to be picked up by a cruising ship of war at a time duly calculated! Pondering on all these chances, I was too well aware that, if through any accident—such as the loss or fracture of a single piece of the steel boat, the insubordination of the black crews which were to man the boats, the sickness of any one of the party—the expedition returned without results, that I should have incurred much blame, and the scheme would have been stigmatised as the Utopian Livingstone Search. Through the admirable conduct, however, of Mr. Young and his associates, the truth was ascertained; and from that moment I had not the smallest misgiving as to the future travels of my dear friend in the interior.

Not dwelling on what Livingstone has already accomplished, for his letters have recently been laid before you, we may now speculate on his future steps, and if we form a right estimation of the course he is now following out, we may not unreasonably calculate the period of his return home. At the date of his last letters,—2nd February, 1867,—the great traveller was at Bemba, lat. 10° 10′ s.; and at that time all the problems respecting the outflow or inflow of the great Lake Tanganyika, about 200 miles to the north of his position, had yet to be determined. He had, indeed, to ascertain whether that vast body of fresh water, about 300 miles in length, and the central part of which only was known to Burton and Speke, was fed by waters flowing into it at its southern end, or sent off a river or rivers to the south-west. Now, this point, I have no doubt, he will have completely ascertained; for as by the last accounts brought by the Arabs he was at Ujiji, which lies in the central part of the eastern shore of Tanganyika, in the middle of October, so we know that he had eight months to settle that important question.

If it should transpire that he found no outflow to the south-west (and we know that there is nothing of the sort to the east), then the great mass of fresh water must have an outlet either to the west at a more northern parallel, or there must be an opening in the mountains at its northern extremity, by which the waters of the Tanganyika flow into those of the Albert Nyanza of Baker. If the first of these hypotheses prove true, and, the Tanganyika being found shut in on the north, a great stream should be discovered flowing from it to the west or south-west, why then my dauntless friend may follow that course of water across an entirely unknown region of Africa, and emerge on the west coast either by the settlements on

the Congo* or by the territory of the Portuguese, to which he penetrated in his first grand travels across South Africa. In this case a very long time, perhaps eighteen months, may elapse, during which we shall be held in anxious suspense.

On the other hand, if the view of Mr. Findlay be sustained,—that a water-communication exists between Tanganyika and Albert Nyanza,—we can much more readily estimate the probable period of his return. In this event, the great physical problem of the true watershed of South Africa and the ultimate southern water-basin of the Nile will have been determined; and in touching the south end of the Lake Albert Nyanza, Livingstone will have, in fact, reached the known waters of the Nile.

If such be the case, opinions are various as to the course he would next follow: some persons believing that he would push on northwards, and, traversing Equatorial Africa, would endeavour to reach Gondokoro, and so descend the Nile to its mouth. For my own part, I have already expressed the opinion that, having once determined the great gegraphical problem which he went out to solve, it is more probable that he would turn to the east coast and find his way to Zanzibar, by a route to the north of that traversed by Burton and Speke. Should such have been his decision, there is nothing unreasonable in the hope of seeing him home in the autumn. If, however, he should be led, through his unrivalled intrepidity and self-confidence, to navigate the huge long sheet of water the Albert Nyanza, and thence endeavour to reach Gondokoro and descend the Nile to its mouth, I give you the following estimate of Sir Samuel Baker, as prepared at my request:—

"If Livingstone," says Sir Samuel, "were to reach the north end of the Lake Tanganyika by the end of November, he would have fine weather until the 15th February, and might reach the south end of the Albert Nyanza by the end of December; and, if all went well and canoes were obtained, he might reach Magungo or the

* According to the map of Duarte Lopez, published in 1591, in Pigafetta's 'History of Congo,' and copied by many of the atlas makers of the sixteenth and seventeenth centuries, the Congo River flowed out of a great lake in Central Africa, corresponding pretty well in position with Lake Tanganyika. Lopez gleaned his information during his residence on the Congo from 1578 to 1587. See Mr. R. H. Major's Paper on Pigafetta's map of Africa, in our 'Proceedings,' vol. xi. p. 246. My attention has been recently again called to this subject of the equatorial lakes, as represented in the old atlases, by the Rev. P. H. Waddell of Glasgow, who has described to me a map of this kind given in a miniature Italian atlas of the sixteenth century.

Nile junction in one month, or by the 1st of February. Now, if the Arabs should have established a depôt since I left Magungo, they would receive him. The Arab traders quit their depôts annually in March, to deliver their ivory, &c.; and if the traveller should arrive among them before the 15th March, they would take him on to Gondokoro. All the boats that descend the Nile leave Gondokoro for Khartum at latest on the 15th April, and if the Arabs receive Livingstone before that time, they will bring him to Khartum about the end of May. The post from Khartum reaches Alexandria in about twenty-five days, and therefore if the great traveller should have to keep this line and reach Gondokoro and Khartum, we should hear from himself by the end of June, if he is to appear this year *viâ* the Nile. In that case he might be in England in August. On the other hand, if, having taken this line, Livingstone misses the Arabs, he will have the greatest difficulty in reaching Gondokoro; and again, if he should not attain that part till after April, there will be no boats to bring him down the Nile to Khartum before April, 1869.

"It is impossible," Sir Samuel adds, "to foresee the difficulties that may occur between the north limit of Tanganyika and the nearest Arab station; but should all go smoothly (which is seldom the case in Africa), it is possible, but not probable, that he might reach Gondokoro in April, 1868. Since I left, three years ago, the Arabs may have extended their journeys far south, and if so, they will materially assist Livingstone and save him from the annoyance and delays that we suffered in Kamrasi's country."

In anticipation of news from Livingstone himself, I have thus put his case before the Society, according as he may follow one of the three routes I have indicated; and my hearers must see that much doubt must attach to the adoption of any decided conclusion as to the period of his return to England; for, even if he should attempt to return by the Nile, we see, from Sir Samuel Baker's explanations, how many fortunate contingencies must combine to enable him to reach England soon. But whether, after determining the true watershed of South Africa, he should emerge by Zanzibar or by the mouth of the Nile, or deflecting from either of those courses, for the reason above assigned, he should reach the Congo or the Portuguese settlements on the west, Livingstone will have so vastly added to his fame, that he must unquestionably be pronounced the greatest of all African explorers. In any case, I trust that, looking to his long and devoted services, and that he has

been acting as her Majesty's Consul and accredited as such to all the Chiefs of the Interior of Africa, the Government will think it due to so illustrious a traveller, so zealous a missionary, and so faithful a servant, to grant him an adequate pension for life, as well as some suitable honour of the Crown.

CONCLUSION.—Reverting, Gentlemen, in conclusion, to the expressions I used in commencing the Address, on the very prosperous condition of our Society, and returning you my heartiest thanks for the kind continuance of the support you have invariably afforded me in my endeavours to do my duty, I must repeat what I have said on former occasions, that you should have selected a younger man to fill the distinguished post which I have so long occupied.

Since, however, you are pleased to keep me in office during another year, I can honestly say that I am as warmly devoted to your cause as ever; and that, notwithstanding my advancing years, I will still strive to be worthy of the confidence you continue to repose in your veteran leader.